

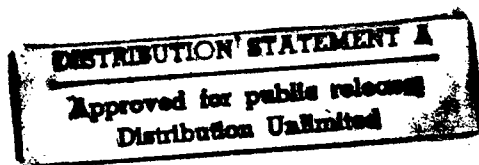


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Science & Technology

USSR: Science & Technology Policy



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Aleksandrov on Emphasizing Basic Research

907A0009 Moscow IZVESTIYA in Russian 14 Oct 89
Morning p 3

[Article by Academician A. Aleksandrov: "Not Darning the Rips: Pragmatic Approach to Science Hinders Development"]

[Text] Fundamental science is called this because, in particular, it creates a foundation for applied research. Through it [applied research], it also becomes a productive force. All the most important fields of modern engineering—radio engineering, electronics, nuclear power, and computers—have roots in basic science. True, their possible uses were not at all obvious in their time, but later—what results! The development of basic science has extraordinary significance, but the difficulty lies in the unpredictability of practical results.

"An extraordinarily critical moment in the history of Soviet science has started: we will lose science as a productive force in society, if we are slow to decisively restructure," begins an article by G.I. Marchuk, USSR Academy of Sciences president, in one of the newspapers. "We lag behind the world level in almost all areas of applied science. This lag began long ago and is related to the overall 'period of stagnation.' In general, we were 'at the same level' and, in certain areas, even ahead 30-35 years ago. When the first satellite was launched in 1957, it was precisely we, the Soviets, who opened a new era in the history of mankind, the space age. Somewhat earlier, a start had been made in nuclear power engineering: the world's first nuclear power plant was built. (Chernobyl was the result of the 'period of stagnation,' i.e., a period of all-round irresponsibility). At that time, we had created a computer comparable to those that others had, the first passenger jet airplane Tu-104, and the hydrogen bomb. Now we have nothing comparable, and malicious tongues can say that we 'will lag forever.'"

Yet, despite all these outstanding results in applied science, the situation in basic science was not bright. The consequences of this period are still making themselves known. These are all fruits of the prevailing ideology and system known as command-administrative. It had and has its significance in solving individual tasks: for instance, space takes the center of attention to this day. However, the same system manifested itself in biology, distorting its development and trampling genetics.

An ideology is embodied precisely in the coexistence of a great achievement like launching a satellite with a great ugliness and disgrace like the trampling of genetics, which understands direct, material, visible achievements and requires immediate uses or pomposity: "Let us fly in space!" However, the more profound achievements of culture, be they in science or in art, were inaccessible to it and therefore detested. Lysenko proposed visible things: peat-humus pots, planting potato eyes, etc., while genetics suggested some incomprehensible kind of genes, chromosomes... This ideology demands rapid uses, which Lysenkoism promised. Science should be steered

toward practice and "assimilated" in it. The term itself expresses resistance that the scientist should overcome. He should not so much move forward into the unknown, so much as introduce that which is already known, and even sew up the rips in industry.

Under the slogan of serving practice, a system was formed which hinders the development of science, as well as the development of industry, since it expects assistance from science, but does not seek, does not hunger to receive new things from it. As a result, science does not operate as a productive force with the effectiveness expected of it. This has been known for a long time. We need restructuring in ideology and in industry itself, in its relationship to science.

The incorrect assessment of science is reflected materially in the shortage of funds, in the "residual principle of financing," the poor provision of instruments, equipment, and so forth, and in the difficult material position of young scientists who have not yet achieved high rank. However, I do not want to dwell on the material aspect, despite its importance, focusing attention, so to speak, on the "idea" aspect instead.

In understanding science as a productive force and the more so under an ideology that demands direct use, the significance of science as a component of spiritual culture is lost and the humanities are pushed into the shadows. Currently, the president writes, we are risking "the loss of science as a productive force," whereas the humanities have already been lost. There was once a remarkable ensemble of humanities (eastern studies, linguistics, history) in Peterburg, later preserved in Leningrad at the university and the academy. It is no more.

I spoke at a general meeting of the academy 20 years ago about the need to direct attention to the sciences of man, and suggested that the academy leadership create an institute of psychology—in vain. The answer was: "Why do we need this?" Meanwhile, even then one could explain the extraordinary practical significance both of psychology, as well as of sociology, ethnography, and linguistics for industry (engineering psychology), resolving ethnic problems, etc. (If serious attention had been paid to ethnographic data in particular in Afghanistan, our actions would have been different).

The basic shortcoming of the academy is that it combines two entirely different institutions within itself: firstly, the academy as a community of scientists for promoting the development of science, and secondly, a state science department for producing scientific results. This contradiction appears quite sharply in elections in the academy. Lev Andreyevich Artsimovich once remarked that previously there used to be two physics: theoretical and experimental, but now another physics—administrative—has appeared. Along with elections in the usual science, elections were held in administrative and organizational science, not of scientists, but of leaders. A great scientist discovers new truths, and a great leader—new institutions.

It is also thought that the director of an academic institute should be an academician, and if someone is nominated for this post not so much as a scientist but as a leader in science, he will be elected an academician. There would be no trouble with this whatsoever, if said person did not introduce an administrative style in leadership and did not strive to control science. As a rule, the less a person is a scientist, the more he aspires to control. A scientific institute requires the provision of a creative and free atmosphere, not control.

In 1918, two physics institutes were created in Petrograd. A.F. Ioffe headed the physical-technical institute, and D.S. Rozhdestvenskiy—optical. The meaning of their leadership was to unite talented youth, from which outstanding scientists grew.

People talk about democratization in science, that "it is not simply a sum total of measures, but some new kind of thinking." However, this "new" thinking is only the forgotten old: the thinking of the early physical-technical institute and the GOI [State Optical Institute]. Incidentally, their founders were not academicians at the time. However, that was another day. The academy has grown now. Democracy remains in it, perhaps, only at the general meeting. However, lately even the role of the general meeting has been reduced to strengthening the presidium's role, albeit under the guise of expanding democracy.

The hierarchy of degrees and titles which is permeating science, rating a person not according to his real position in science, but by rank, does not contribute to developing democracy. By title, academicians are considered great scientists, and without this outward rank the system does not rate a person their equal or even superior in terms of scientific results. Concentrating power, an academician can hold two positions: a director, chairman of a council on dissertation defenses, editor-in-chief of a journal, chairman of a scientific society, or presidium member, and can ensure the failure of an undesirable candidate by putting together the scientific council.

The documents that are required in various cases for no need whatsoever also do not help scientific work. For example, expert reviews of works in fields where there is nothing to be kept secret, or references, for instance, "on the author of a dissertation" (only denunciations were written with the preposition "on" in the accusative case, as though the "reference" requires the genitive case and the preposition "on" gives it the appropriate nuance). A work is defended, but the information about the author's political literacy, etc., seems inappropriate. Of course, one could assume that the author of the dissertation is, for instance, a criminal, but this is such an extraordinary case that it hardly follows to accompany each with a certificate of trustworthiness.

Science, one could say, has been entangled in the nets of concentration of power, worship of bureaucrats, love of command, paperwork, false ideology, and the narrowness of views that evaluate what to demand from science

and what to permit within it. Highly-placed scientists do not always have sufficiently broad views and can reject or push aside research that goes beyond the limits of their vision, whereas the genuinely scientific position lies in research rather than in a-priori judgements that "this cannot be," remembering what was said in *Hamlet*: "There is much in nature, friend Horatio, that our wise men have not dreamed of."

The structure for scientific organization which we should aim for can be imagined as follows: firstly, science is developed in independent scientific-educational centers (NUTs), formed by VUZs (especially universities) combined with scientific research institutes and, secondly, in industrial associations and companies. These centers for scientific development have full autonomy. In particular, the NUTs are administratively independent of Goskomobrazovaniye (RSFSR Minvuz, let us note, has developed an unbearable bureaucracy with regard to scientific work in VUZs).

The development of predominantly basic sciences, the natural sciences and humanities, are concentrated in the university centers, and the development of applied sciences—in the industrial associations. However, research of a purely cognitive significance, thereby belonging to basic science, can be done there. Such a combination is useful for raising the level and focus of applied research.

In turn, the presence of directions of an applied nature in university centers is useful. These centers should receive the necessary material support, since basic research does not yield quick profits. However, work on economic contracts could be done, so long as the scientific institute is not converted into an office for filling orders, so that basic research is in no way oppressed. Such research cannot be converted to cost-accounting and requires state support. By refusing generous support, the state risks losing the future. If it had not been for Ioffe's Physical-Technical Institute and the cognitive work within it, the atomic bomb would hardly have been created in the corresponding time period and the country would have been left defenseless in the face of the nuclear threat.

The combination of science with education is fruitful for both sides of this union: students have an opportunity to participate in scientific work, while their constant presence gives the scientific collective the vitamin of youth. Moreover, teaching forces a scientific employee to expand his range of interests. He can be a narrow specialist at an academic institute, but giving lectures and conducting classes requires a broad range of interests covering the scope of his science on the whole. This same expansion of range of interests serves to unite different departments and faculties.

For a scientist, work in a VUZ has a shortcoming in that it forces him to perform teaching hours, which are so long under the present system that they interfere with his scientific work. However, this is easy to change if the staff is expanded by combining a VUZ with a scientific

research institute. An active scientist, having only 2-4 hours of lectures per week, would then be free, the more so since he is paid for teaching, while it is hard to pay for true science, much like paying for poetry. What more does a scientist in the humanities who requires neither instruments nor equipment need?

World experience in the development of science, especially physics, shows that the main achievements were made in universities—in Cambridge (nuclear physics, DNA structure), California (elementary particles), and Copenhagen (theoretical physics). It is instructive that De Gaulle, speaking at the Novosibirsk Akademgorodok, addressed M.A. Lavrentyev and those gathered with the words: "Mr. Rector! Gentlemen professors!" "The academy" the head of an Italian state committee on science once told me, "is a group of old scientists..." Of course, it is ironic but, in general, the academies in the West are like scientific societies. The London Royal Society (Academy of Great Britain) is precisely a society, and its members pay dues.

Our academy should exist as a higher society which unifies science, one of whose main tasks should be to observe a general high standard for scientific requirements. Scientific institutes, all-union in the direct sense that they should grant temporary jobs to associates from different cities, could belong to the academy. Along with work on trips and internships abroad, there should be concern that a person, especially from the "periphery," be able to work at an outstanding domestic center, interacting with great scientists, and for a fairly long period of time at that.

Besides which, there are scientific congresses and conferences, libraries, publishing houses, and journals which cannot be shared among all centers and, finally, unique equipment (for instance, large telescopes) located in certain all-union institutes, which scientists from different scientific centers would be able to use according to a competition arranged by the appropriate committee for the programs.

The academy will serve as a unifying center for all this, especially the internship of scientific workers from different places, by ensuring communications and the exchange of associates, seeing to communication and the overall level of different centers. It should be responsible for the expert analysis of large projects through the appropriate scientific institutes.

Turning to the sciences being developed by industrial associations, it should be noted in particular that two of the most, one might say, significant discoveries in physics in the 1920s were made in the laboratories of industrial companies in the United States: the "Compton effect" at the Bell Company, and electron diffraction at General Electric. Physicists understand the epoch-making significance of these discoveries, especially the latter. Our government must think about this. A great scientist, a creative group of researchers, not only raises the tone of applied work, but sometimes can give a

significant effect by casual advice and consultation, entirely repaying expenses for "useless" research in pure science.

Workers in applied science should also be granted the opportunity to intern at scientific centers, in academy all-union institutes. It should provide an opportunity for forming temporary work groups, joined in order to solve one problem or another. Interaction is a necessary condition for the successful development of science. A "feudal" fortress, often screened with contrived secrecy, hinders movement and creates conditions for the growth of sickly and false "flowers" in closed "hothouses."

Correspondence has been the standard form of interaction among scientists since the days of the ancient Greeks, and now it has an expanded form, the scientific press, journals above all: an author can report his results to all who wish and, in addition, assert his worthiness in the scientific world. A new result can be caught up and can give a start, if not to a flow, to a number of new works. In short, rapid publication has great significance in a number of respects.

Meanwhile, we do not have rapid journal publications: in an ordinary academic journal, articles wait 2-2.5 years to be published; in academy reports a year as a minimum. This situation humiliates scientists, humbles domestic science in the face of foreign, where publications are fast, and hinders our development. Over 40 years ago, P.L. Kapitsa wrote that a journal article is like the packaging in which a scientific result is wrapped. Thus, imagine that new machine tools do not reach their destinations for 2-3 years due to a lack of packaging. In short, the situation with scientific publications here is bad, and it is not clear that it will be corrected: those on whom this depends do not deem it significant.

Great freedom in publication is also necessary: better to publish ten nonsensical works, than to bury a single worthy one. That which is original often seems highly questionable. A scientific journal, due to a naturally small circulation, requires little paper, so references to the paper shortage are unsubstantiated. The main point, firstly, is the desire of ideological bureaucrats that there be fewer publications and, secondly, the insufficient respect for science.

Perhaps, the clearest (or more aptly, gloomy) manifestation of disrespect for science is the disdain for its conclusions and instructions on vitally important problems. The Afghan war was already mentioned. There have been numerous conclusions about the Volga-Chogray canal on the part of ispolkoms and obkoms, but there has been no preliminary, thorough expert scientific analysis. So, first the leadership makes its instructions, and later, if at all, turns to science. The opinion of chiefs is placed above scientific conclusions. This anti-scientific and, accordingly, anti-Marxist ideology has not disappeared and is maintaining its influence.

It is necessary to return to a genuine Marxist world view with its unconditional respect for science, its aspiration

toward truth and freedom. The main condition for the development of science is precisely the freedom of the researcher, under the strictest inner control of his good conscience.

Leading Science Officials Discuss Future Reforms

907A0007A Moscow POISK in Russian No 21, Sep 89
pp 4-5

[Report on POISK round table with Vice President of the USSR Academy of Sciences Academician Yuriy Osipyan, director of the Institute of Solid-State Physics; Academician Vasiliiy-Andrey Borovik-Romanov, director of the Institute of Physical Problems imeni S. I. Vavilov; Academician Yevgeniy Chelyshev, secretary of the Literature and Language Department of the USSR Academy of Sciences; Professor Aleksandr Yakovlev, head of a sector of the Institute of State and Law of the USSR Academy of Sciences; and Aleksandr Mitroshenkov, editor in chief of the newspaper POISK, prepared by Yelizaveta Ponarina and Mikhail Dubrovskiy, under the rubric "What Is Science to Be Like?": "The Nonsubordination of Thought"; first six paragraphs are POISK introduction; last two paragraphs are POISK conclusion]

[Text] "The ways and means of perestroika in science do not differ in their nature from perestroika in society—these are profound structural reforms with the democratization of the internal life of the scientific community." President of the USSR Academy of Sciences Academician G. Marchuk says in his statement "What Is Science to Be Like?" (POISK, No 12). What, in the opinion of scientists, should these reforms be? What is it necessary to do today? This was discussed at a round table, the participants in which were:

Vice President of the USSR Academy of Sciences Academician Yuriy Osipyan, director of the Institute of Solid-State Physics;

Academician Vasiliiy-Andrey Borovik-Romanov, director of the Institute of Physical Problems imeni S.I. Vavilov;

Academician Yevgeniy Chelyshev, secretary of the Literature and Language Department of the USSR Academy of Sciences;

Professor Aleksandr Yakovlev, head of a sector of the Institute of State and Law of the USSR Academy of Sciences;

Aleksandr Mitroshenkov, editor in chief of the newspaper POISK.

Osipyan: There are two views of the role of scientists in perestroika. On the one hand: members of the Academy and representatives of science are being included in the government, state organs are enlisting scientists for consultations and evaluations. This, of course, is absolutely correct, for the scientific intelligentsia today is that part of society, which is strongly influencing the fate of perestroika. But, on the other hand, now claims are

being lodged more and more often against science. Here, for example, at the 19th party conference V. Bakatin, then first secretary of the Kemerovo Oblast Party Committee, said: my neighbors from Novosibirsk are fine fellows. They started their own science at the right time (it is a question of the Siberian Department of the Academy of Sciences—editorial note), while we did not have time. Science of the capital, Bakatin said, will not climb into a mine. If it were our own science, we would send it there, but you will not order that of others.

Yakovlev: Are they not putting science in the place of real culprits? I have also heard this gossip: science does not reflect objective reality and is not a window to the world. If that is so, let us take a look: Why does it not want or is it unable to perform its functions?

Mitroshenkov: The editorial office of POISK receives several tens of letters a day. I would like to quote lines from one of them: "...Who is responsible for the stagnation? I have an unequivocal reply—science. Who, if not it, is to give the warning, to indicate the social ulcers, and to sound all the bells? Yes, Brezhnev and his entourage invented 'developed socialism,' but why did our men of science not find in themselves the strength to say in a clear voice that this term is at least unscientific?... [Signed] Mikhail Gostev, Voronezh."

What can be said in response?

Chelyshev: Various organizations of the Academy are making a large number of constructive decisions on most important problems, on the preparation of which a colossal amount of assets, labor, and energy of scientists is being spent, but these decisions are ignored.

I will cite just one example from the activity of the Literature and Language Department, which I head. Studies of the problems of interethnic and interlinguistic relations in the country have been conducted here a long time. Soon the USSR Supreme Soviet should pass a special law on this question. We have familiarized ourselves with one of its drafts. It is a serious document. However, several important provisions are lacking in it. For example, the primary thing is that the status of Russian, which, in our opinion, should be the official or all-union language, is defined vaguely, and the guarantees of the free use of one's native language in all spheres of social life of the republics are unclear.... Why? Because the suggestions of scientists on these questions were not accepted. So, is science again to blame?

All cases of the disregard of the opinions of scientists and their expert evaluations, apparently, should be examined at meetings of the presidium of the Academy and be brought to the attention of people's deputies and the corresponding representations should be made to the government. But then our experts do not have the right to vote when decisions are being made!

Osipyan: And they should not have it. An adviser is not the person who takes a legislator by the arm and says: sign right here. He sets forth the objective essence of the

matter—and leaves the room, shutting the door behind him. It is the business of the legislator to decide. A government person is distinguished from a scientist precisely by this. It is a different matter that it is necessary to develop some system, in case of which the opinion of scientists would be taken into account without fail. There are the following words—lobbying and lobbyists. If scientific personnel have a definite opinion and are certain that it is a well-founded, scientifically substantiated one, is it not our duty to form such an order, in case of which legislators—whether or not they want to—would be forced to take this opinion into consideration?

Yakovlev: This depends on the status, which the commissions of experts attached to the legislature have. We have, after all, a strange manner: we pose a problem, which concerns some department, but ask this department itself to give an evaluation of its own activity. It is absurd! We are asking a department to censure itself. Do you remember the attempt to establish a government commission to investigate the actions of the government in Tbilisi? The sober approach prevailed. A legislative commission was established!

The turning of evaluation into a state matter also worries me. The settlement of a fundamental question is impossible until all departments agree and give their "go-ahead." But a decision, which has been fully agreed on, is meaningless! Hence, it does not affect anyone and does not change anything. Now the same thing is also happening with the claims against science of Bakatin and the miner, who inquired at the Congress of People's Deputies why he, just as 100 years ago, brandishes a shovel in the mine. It is the same trouble: they address reproaches to science, but it is necessary to address them to the management of our economy.

Osipyan: I assert that science did a minimum of half a century ago everything that is required in a mine. The shovel there is not a scientific problem, but a social phenomenon. At the end of the last century we had advanced literature, a teacher of all civilized mankind—Tolstoy, Chekhov, Dostoyevskiy. But 90 percent of the population of Russian was illiterate! So, is literature to blame?

Borovik-Romanov: Our industry does not want any new developments. All of it is busy with the plan. It has no time for science. And until the new economic system forces industry to update production continuously, it will not need science, and applied science will simply idle....

Yakovlev: And still science is also to blame for something. In this case I am talking not about the natural sciences, but about....

Borovik-Romanov: ...the "antinatural" sciences? That is what Landau called the social sciences.

Yakovlev: Exactly. Why, for example, is jurisprudence in our country in a pitiful state? Throughout the world a

lawyer graduates not simply from a university, but after that studies another 3 years in law school. That is how things stand, for example, in the United States.

In our country in the system of the Minister of Internal Affairs there are 14 higher educational institutions. In essence these are no more than police colleges. Of what interest are Hugo Grotius and the basic problems of law in general for a staff member of the Minister of Internal Affairs? They teach him criminal law and investigation techniques.

Throughout the world the university is the center of the preservation and passing on of the eternal legal (and not only legal) values of civilization. If, of course, one understands by law not the rod, but the optimum means of the interaction of people in a democratic society. So, when we speak about the social sciences, an additional problem arises: the problem of their scientific nature.

Chelyshev: The first signals of trouble in the social sciences were heard back during the years of stagnation: students "voted with their feet"—they did not go to lectures on the theory of Marxism-Leninism, on philosophy, and so on. Our textbooks on the history, culture, and economics of the Soviet Union of the Progress Publishing House are not being used abroad. They used American and English ones on the same issues. Why?

Yakovlev: Academician Rumyantsev once remarked that our terms are incomprehensible to the western reader. For example, "decaying capitalism," "the socialist market"....

Chelyshev: They said to our face that this is not science, but propaganda. We had distorted history. We had turned Marxist-Leninist theory into an absolute truth which is slipping from the course of time. But, after all, many works of the classics of Marxism are hypothetical. Life has refuted them. And Stalin made his contribution to the dogmatization of these theories. As a result the superstitious fear of the classics so far has not yet been overcome. Scientists are often afraid to touch the problem of the legacy of Marxism-Leninism.

Yakovlev: I believe that here it is not so much a fear of being punished. This is no longer so urgent. But there is a fear of oneself, of what you already published and wrote in previous years. How is it, dear friend: Did you either lie your entire life or were you mistaken? A certain moral, intellectual feat is required in order to rise above oneself....

We also have to this day textbooks that were written after patterns of the 1930's, and collectively besides. The sources of mediocrity also lie in this. We somehow lost sight of the fact that a new idea is conceived only in individual consciousness. A new thing arises only in this cosmos. No collective creative work is capable of creating it. This is a great mystery, a great miracle, and the hope of mankind.

Are we adequately encouraging these shoots of individuality at the undergraduate, graduate, and academic level? Are we protecting the individual from hard collective embraces?

Chelyshev: This problem is hidden first of all in the standardization of our system of education. Aboard every university has its own program. The scientific council formulates it and is responsible for the quality. Therefore, the University of Munich is one thing, while the University of Hamburg is another, and the University of Göttingen is yet another. Each one has its own character.

Yakovlev: Where is state monitoring of scientific and pedagogical activity needed, and where is it not?

In the middle ages the development of science began with the autonomy of universities. But where do we have it now? Who gives orders to science?

Borovik-Romanov: One must not give orders to science at all....

Mitroshenkov: Let us return again to the mail of readers. "The USSR Academy of Sciences, which has behind it the age-old traditions of free-thinking and democracy from as far back as the times of Lomonosov, has developed into a certain ministry of science. What just the procedure of getting through to the building of the presidium of the Academy takes—with a reserved pass and with an alert militiaman at the entrance. [Signed] Arkadiy Borisevich, Minsk."

Yakovlev: Suppose a scientific council will undertake the function of management better than a ministry. That is, the "elimination of the ministerial nature" of science and universities is necessary.

Borovik-Romanov: We are now living like in the army: we have a marshal—the president of the Academy of Sciences, then there are the colonel generals from the presidium, lieutenant generals, and so forth. In reality everything should be the opposite. The scientific associate, mainly the young scientific associate, should be the leading unit.

I have noted many times: one only has to leave the laboratory for a long time, and now a graduate, now a graduate student, having been left alone, will think up something interesting. Apparently, the entire hierarchy that exists at an institute—the director, the deputy director, the head of a department, a laboratory, a sector—prevails over a person. And under such oppression independence is suppressed psychologically. But when he is left alone, he begins to think. And this is the primary thing that the scientific associate should do. In our country it is believed that it is necessary to organize science. No, it is necessary to give people the opportunity to think!

Chelyshev: That is, one must not organize science? In my opinion, this is debatable. The pluralism of opinions and scientific approaches can contribute to the development

of our society only when it is concentrated around some specific core. Otherwise diversity is capable of leading to disorganization and to the loss of reference points. And what is more, similar processes are occurring in society. We might lose the stabilizing element and continue the endless disputes. Especially on the questions of the sociopolitical and economic development of our society.

Borovik-Romanov: But it is impossible to establish a state in accordance with science, by instruction. The basic mistake was also in this—we believed that we were building a scientific state.

Yakovlev: I believe that there should be a core, but it should be formed from the natural selection of opinions, concepts, and views. But as soon as this core has been formed, our entire hope is that something in conflict with it, which with time will become another core, will appear. Indeed, it is impossible without a core, but a core that is formed as a result of competition as the resultant of ideas, thoughts, and talented people. No one is capable of influencing scientific development in a strong-willed manner—not the Academy of Sciences, not any department, not the Lord God.

Borovik-Romanov: Let us return to the organization of the institute of the Academy of Science. It is very important that only creative and completely independent scientists would be on the permanent staff. They should determine themselves the program of their own research. The finding of such talented people and their taking on the staff of the institute are the main link of the organization of basic science. A very small scientific council under the supervision of the director should recruit this staff.

Yakovlev: Have we returned to the director being a god?

Borovik-Romanov: I believe that if we were to succeed in eliminating all the pointless bureaucratic correspondence, lead associates could alternately perform the functions of the director for a period of 1-2 years.

Osipyanyan: But there are also hidden reefs here. One must not allow the permanent staff of the institute to be inflated. You realize that there is a difference between a model student and scientist. De Broglie observed this, having said that a profound dialectical contradiction exists between pedagogical, didactic activity and scientific work. The lack of faith in the truth of what you do is the motive force of the scientific approach to reality. Belief in the fact that you are speaking the truth is the motive force of education....

Borovik-Romanov: Imagine: a prominent scientist works at an institute, while an efficient graduate student, an assistant in everything, is attached to him. But the more he tries to please his supervisor, the fewer the chances are that he will become a genuine scientist. His mentor believes as follows: I have spent effort and time on him, he is helping me. Let him remain with me on the permanent staff. He goes to the director and requests: leave me the graduate student.

Unfortunately, there are few directors who actively resist such requests. Here very many institutes have expanded due to such graduate students. Not the worst ones, but average ones. And gradually the institute "becomes average."

Osipyan: What is to be done?

Borovik-Romanov: Only the rejection of giant institutes can be an antidote.

Yakovlev: But what if a new scientific direction ripens in the midst of an institute? It is necessary to insist on its detachment. The present rigidity of the organizational forms and the existence of enormous monster institutes are not conducive to such separation. Much flexibility is needed here.

Borovik-Romanov: The main and a psychologically difficult task in the selection of scientists is to seek people, who are more capable and more intelligent than you are. If the director is only an administrator, and a strong-willed and arrogant one besides, he will not particularly support new directions....

Osipyan: It is this that is the problem of the democratization of science. What now worries people? The ossified structure, departments, and the administration are getting in their way. They are not certain that, having completed a job, they will be able to bring its results to the notice of the community.

Mitroshenkov: It seems to me that we are approach a very important theme. Here is the following letter:

"It is well known: theoretical developments, models, and software are not patented. The only means to firmly establish priority is quick publication. However, today it is possible only on behalf of an institution. Science often requires a step aside and responsibility, which the researcher himself assumes. Who will guarantee him the opportunity to appear in print? [Signed] Igor Korotov, Moscow."

There are tens of letters about this in our mail. We have already printed a number of them, for example, those of Professor A. Malenkov (POISK, No 13) and Corresponding Member Yu. Polyakov (POISK, No 19).

Candidates of sciences often assert that if in your research you sidestep the basic direction of the institute, you are trapped. An author's notice is required for the confirmation of authorship. But, in order to get a work published in a scientific journal, you should first get permission of the institute. Or read a paper at the corresponding scientific seminar and get its recommendation for a journal. All three are problematic. However, after this there is also no guarantee that you will get through to the type page.

Yakovlev: Is there really such a rule?

Osipyan: There is, and it is justified—we too often encounter elementary mistakes.

Chelyshev: When an author has prepared an article, which refutes the views of the majority of his colleagues, it is necessary to weigh everything carefully....

Borovik-Romanov: A negative result is also a result. They bring to the journal many letters from so-called lunatics. Some refute the theory of relativity, others invent perpetual motion. Such letters, of course, are responded to appropriately. However, there also are, true, very rarely, such instances when even in such a specific science as physics entirely new discoveries are not accepted by the scientific community. As an example it is possible to cite the discovery of electron magnetic resonance by Ye. Zavoyskiy. His first reports were greeted by the majority of leading physicists with distrust, and only Petr Leonidovich Kapitsa immediately realized the enormous importance of this discovery, and with his assistance the works of Ye. Zavoyskiy received proper appreciation. It is necessary to bear in mind that the more significant a discovery is, the more difficult it is for contemporaries to understand and appreciate it.

Yakovlev: Should one, perhaps, lend glasnost to the work of the editorial board? So that the scientific community at large could find out which articles were rejected during the year and why and which ones were accepted and why. Moreover, the possibility for any author to publish himself in foreign journals will partially eliminate the problem. If you have an idea, write....

Borovik-Romanov: A published work in the foreign publication no longer testifies to anything. Now in the field of physics more than 50 percent of the foreign journals are commercial publications. The content does not interest them at all—libraries, not individual subscribers, subscribe to these journals.

Yakovlev: The trouble also is that in our country such a value as the scientific reputation has been lost. It should be the main regulator of the quality of the scientific product.

Borovik-Romanov: In the field of physics such a concept as reputation exists for sure.

Yakovlev: I believe that it also does in the fields of the humanities. But a reputation has two levels: the formal level, which is expressed in positions and titles, and the informal level. A reputation exists, but it is important that people would get the platform precisely on its basis, and not in conformity with rank. Not for nothing is the question of independent journals being actively discussed by the Union of Scientists....

Osipyan: The Union of Scientists, it seems to me, should first of all work on some general problems: social protection, publications.

Chelyshev: It, in my opinion, should be divided into professional groups—like a physics society, a chemistry society, a society of entomologists, which should work in close contact with the departments, committees, and associations of the Academy of Sciences. It might

become the ideal structure, which would make it possible to link up the Academy with the rest of the scientific community.

Yakovlev: I believe that the Union of Scientists first of all should be a tool of scientific thought. It would not be a bad idea to consider the idea of a bicameral structure of the Academy. Young people, after all, are rebelling against the impossibility of influencing the making of the most important decisions at the Academy. Including those that directly concern them.

Chelyshev: There are enough both arrogance and unsatisfied self-respect there....

Borovik-Romanov: This is not their fault. This is our misfortune. In our country so many mistakes have been made that I do not know whether it is possible to correct them at all. In the majority of countries of the world the basic sciences are being developed mainly at universities and are closely connected with education. The scientists there conduct science and at the same time teach it to subsequent generations. Young people while still undergraduates test themselves by participating in the conducting of basic research at the most advanced levels of science. As a result, on graduating from the university, they can choose what suits them more: basic research or a job in sectorial science or the prospect of becoming a businessman.

The majority of our undergraduates lack such a choice. People from technical higher educational institutions, who never associated with prominent scientists who conduct basic research, get into sectorial science. They were not taught that the main task of a scientist is to think up something fundamentally new, and industry, which is oriented toward the gross, is not contributing to their development. All the energy of young scientists is being idled away.... A bicameral system will hardly help here.

Osipyan: And still it is necessary to seek a solution. It is time to relieve the strain. At each of our institutes there is a scientific council which is elected by the entire collective. I have also heard the statements: Should we not make at the Academy of Sciences an academywide scientific council? It would be elected by all the scientific associates of academic institutions and would consist, say, of 100 people. At the Academy there would be two organs or two chambers. The presidium and the scientific council. The latter would meet, for example, once a year. All scientific personnel would address themselves to it. Indeed, the scientific community is now far from participation in the making of decisions on issues that concern it. It is probably necessary to give the right to vote to tens of thousands of scientific personnel of the Academy with an academic degree....

But is it perhaps sufficient to have only a scientific council at each individual institute? Does every scientist need to be aware that he is participating in the settlement of academywide affairs? And what is to be regarded as such—the choice of scientific directions or the financial

report? Is it conceivable to discuss a specific scientific direction at a meeting of a collectively elected organ which consists of specialists in different scientific fields? What should an organ of this sort do, if it is established?

If we correctly specify the goal of the establishment and the functions of such a council, it will be easier to find an appropriate organizational structure.

As you see, there are many questions. We will hardly be able now to give an answer to them. And, after all, not only we have to answer them. I would like to receive answers to these questions from the scientific community....

That is how our round table concluded—with questions like an ellipsis.

We address these questions to the readers of POISK. We await your letters.

Long-Term Science-Policy Program Attacked

907A0013A Moscow PRAVDA in Russian 10 Oct 89
2nd p 3

[Article by Yu. Orfeyev, candidate of philosophical sciences: "Taboo on Mistakes"]

[Text] Quite recently, a report appeared in the press on the comprehensive program for scientific and technical progress of the country until the year 2005, developed by the GKNT and the USSR Academy of Sciences. The broad scientific community is unfamiliar with it and, naturally, a mass of questions arises: who compiled it and how, why must precisely these directions be developed, and not others, and will society be prepared to utilize the fruits of these developments?

The secret development and adoption of this program, in my view, is the clearest example of the imperfect planning and financing of our science. In principle, is it possible to see so far when it is a question of a changing phenomenon such as scientific and technical progress? After all, tomorrow a household thermonuclear reactor, superconductivity, or other discovery might appear, radically changing our concepts and the development of society. What would it be like then: after all, the money has already been allocated, and the resources distributed until the year 2005? We are wearing ourselves out with Procrustean planning. Or, let us assume, it turns out that the chosen direction of scientific exploration is erroneous and unproductive. How will this be determined in time and the resources redirected in a more promising direction? After all, scientists are not interested in admitting the lack of promise of their own area of scientific exploration.

An internal mechanism for self-organization must be created in science so that this does not happen, tuning into the needs of society and accountable to it. I am referring primarily to the creation of a reliable system of expert analysis for all programs undertaken, for all decisions being drafted. Let me note that in the United

States the federal government alone spends 2 billion dollars annually on all possible kinds of consultation. The expert is responsible for his verdict equally with the executor. There is no similar practice here at all. In the West, an entire social institution for so-called critical science has formed. It includes "scientific courts" which solve debatable questions between scientists and society, a mass of scientific publications that hold the process of development of science under control, and various committees on ethics which see to morality in the scientific environment. This system quickly reacts to financial, organizational, purely scientific, and moral imperfections in science. Not possessing such a counterweight, we invariably become prisoners of our own mistakes, illusions and myths. Today the most important task of the GKNT, USSR Academy of Sciences and our other, numerous high scientific organizations is not to compile plans, but to create precisely such an inner mechanism for the self-development of science. I am quite certain that it will choose the most promising directions for applying its efforts independently, and with far greater success. It is not worthwhile to think for scientists.

Overcoming Gap Between Basic, Applied Science
*907A0012A Moscow IZVESTIYA in Russian 3 Oct 89
Morning Edition p 3*

[Article by Academician A. Rzhanov, director of the Institute of Semiconductor Physics of the Siberian Department of the USSR Academy of Sciences, Corresponding Member of the USSR Academy of Sciences K. Svitashhev, and Doctor of Physical Mathematical Sciences Professor S. Stenin (Novosibirsk): "How Much It Is Possible to Lag... The Brilliance of Scientific Ideas and the Poverty of Technical Progress"]

[Text] As is known, in economic might the Soviet Union is one of the first in the world. At the same time with respect to very many indicators we are at the level of underdeveloped countries. We will not talk about agriculture or the saturation of the consumer goods market. Let us talk about scientific and technical progress.

Thus, we need real scientific and technical progress. It developed so historically that we somehow dealt more with equipment, having forgotten science, and, consequently, it is necessary to change fundamentally the policy toward the so-called introduction of technological innovations. The key thing, and here we are not revealing anything supersurprising, consists in the sharp increase of the economic interest of both enterprises and scientific institutions in the maintenance of a high level of research and in the quick use and extensive application of the latest developments. One will not achieve this while enterprises are cut off from science and science is cut off from special development, so to speak, firms. Therefore, we see one of the version of the solution of the problem in the establishment of unified cost accounting complexes (not at all giants without fail), which include leading scientific institutions, development organizations, and pilot plants.

In order to prove this assertion, let us examine a sector that is close to us professionally—microelectronics, especially as the lag here is most striking. For example, the present level of computer production in the USSR (computer memory capacity, the output of high-speed machines, and so on) comes to only about 1 percent of the American level. As to consumer electronics, at times there is simply nothing with which to make a comparison. For example, video recorders, which are already widespread in many countries, in our country are still luxury items. But the whole point is the low technological level of our domestic electronics industry. We are constantly late with the use of the latest scientific developments in the chemistry of ultrapure substances, in semiconductor electronics, and in other fields, which affect progress in the development of the element base.

Here it is impossible to say that we are lacking in new ideas and that we do not have advanced basic achievements. The store, which we are acquiring at the theoretical and experimental level, simply is not becoming at once an achievement of industrial enterprises, which in practice are not interested in their use due to inadequate stimuli for this. Here it is turning out that our priority scientific developments in the field of microelectronics, while enriching world basic science, are not enriching our economy. Western firms are leading us here, and at times we purchase from them technological processes that are based on our ideas.

For illustration let us cite the following examples.

In semiconductor physics one of the main directions is the development of the theoretical and experimental principles of the growing of the thinnest layers of dielectric materials, such as quartz glass and silicon nitride, and the lending to them of set electrophysical properties. Back in the early 1970's a reduced-pressure reactor for the synthesis of layers of materials was developed at the Institute of Semiconductor Physics of the Siberian Department of the USSR Academy of Sciences. Using the principle of introduction, we transferred such reactors to a number of enterprises in Novosibirsk, Kiev, Sverdlovsk, Moscow, and Riga. According to estimates, the new technology ensured a thirtyfold increase of labor productivity, while having also increased the quality of materials. But due to the sluggishness of industrial personnel these reactors did not become widespread. In the West the first publication on the fundamental possibility of developing such reactors appeared only in 1977. Now new reactors, which are more advanced and made it possible to carry out a process that eliminates the emission of harmful substances into the air, have already been developed at our institute. Unfortunately, the Ministry of the Electronics Industry, which has practically monopolized in our country the development of the element base, is not displayed any interest in the extensive use of the reactors, which for the present are still advanced in the world. What awaits us? Of course, western firms will also display efficiency here, while we will then be forced to go begging to them.

For precisely that happened with the technology of the laser annealing of semiconductor materials, our domestic development. The phenomenon of laser

annealing was discovered for the first time in the world independently at the Kazan Physical Technical Institute and at the Institute of Semiconductor Physics. The scientific publications about the results aroused the liveliest interest in all developed countries. And first of all from the standpoint of practical application. For example, the American company AT&T adopted this idea immediately after the statement of Soviet scientists as a symposium in Albany in 1977. And only after a report that such work was being conducted abroad, did Soviet enterprises take an interest in the effect of laser annealing.

It is obvious that we need to eliminate somehow the gap between basic research and the applied developments based on it. But this gap is enormous. Analyzing the development of semiconductor electronics, it is possible to note that now, compensating somehow for this discrepancy, a certain intermediate area of activity, which henceforth we will call the following—goal-oriented basic research—emerged. The existence of free inquiry, planning flexibility, a reasonable share of risk, and the alternative of choosing means in the achievement of the goal characterize it. Such research is very close to applied science, although it is conducted at academic institutes. This phenomenon, in our opinion, underscores the urgent necessity of uniting the two types of scientific and technical activity—basic and applied.

As the world experience of the development of microelectronics shows, applied science firms of a new type, which are capable of supporting, and very efficiently, the entire chain of the emergence of a technology from the basic idea to prototypes and even series of new instruments or systems, appear on the basis of goal-oriented basic research.

Our proposal is that goal-oriented basic research in our country would acquire real masters, who have both

sufficient powers and the necessary material base. If we proceed from the terminology adopted by us, this implies the establishment of complexes (associations), of which a "basic" institute, a powerful design and technological bureau, and a most advanced pilot works, which is equipped with modern technology, would be a part.

The establishment of academic scientific technical complexes (ANTK's), which could distribute an end result in the form of new experimental technologies and prototypes of products, would be advisable for many important directions of scientific and technical progress, including microelectronics. It seems that such complexes can conduct research both in accordance with orders on the part of the state (state orders) and on the basis of economic contracts with specific clients. In the final analysis the academic scientific technical complex is capable of existing on full cost accounting and self-financing, that is, of being a socialist enterprise enjoying full rights, which produces a science-intensive commodity. This circumstance illustrates well the once famous phase that science in our times is becoming a most important productive force of society.

The establishment of academic complexes (academic scientific technical complexes), of course, is not a unique means for the elimination of the gap between basic science and production. This version may be suitable for especially important science-intensive directions, precisely there they will yield the greatest impact. And only if this will be not simply the change of the "sign" on an academic institute, and if a genuine complex with large design and technological services and production services will be established. Only such integration can bring us success, that is, make a breakthrough in our lag behind the leading countries of the world.

Science Officials Debate Success of Self-Accountability

907A0015A Moscow *EKONOMICHESKAYA GAZETA* in Russian No 36, Sep 89 pp 9-11

[Report by Ye. Babak on meeting of the Business Club of *EKONOMICHESKAYA GAZETA*, conducted by N. Yakovchuk, under the rubric "The Business Club of *EKONOMICHESKAYA GAZETA*": "The Results and the Wage. Science on Cost Accounting. What Has the Experience of 1.5 Years Shown?"; date not given; first five paragraphs are *EKONOMICHESKAYA GAZETA* introduction; last four paragraphs are *EKONOMICHESKAYA GAZETA* conclusion]

[Text] The USSR State Committee for Science and Technology:

Cost accounting at scientific organizations increased the intensity of the labor of scientific personnel and unleashed their initiative. In 1988 the volume of performed work increased by 1.64-fold, which was accompanied by an increase of its scientific and technical level. The share of developments, the parameters of which exceed the world level, increased from 10.1 percent in 1987 to 15.2 percent in 1988. The highest results in this respect were achieved in the machine building complex.

The USSR Committee of People's Control:

With the changeover of science to cost accounting the themes of many studies became petty. The proportion of the work on the development of new equipment, which corresponds to the best world models, is declining. In the machine building complex it decreased from 11.3 to 9.1 percent. In turn the duplication of old developments and developments of others at overstated contract prices became widespread. The collectives of scientific research institutes are putting in first place the derivation of a profit at any cost.

For more than 1.5 years sectorial scientific research institutes have been operating under the new conditions of management. It is clear that cost accounting was introduced here not for the sake of cost accounting, but in order to increase the efficiency and the return of the labor of scientific personnel. Was it possible to achieve this? The participants in the business meeting at the editorial office expressed directly opposing opinions on this account.

A Step Forward or Backward?

A. Kazakov, deputy chief of the Department of the Improvement of the Economic Mechanism of the USSR State Committee for Science and Technology:

For me the apt statement of one worker, whose letter was published in the newspaper, is the criterion of the evaluation of the effectiveness of cost accounting. He wrote that he would believe in cost accounting only if people as a result of its introduction would chase work

and if at least one of the organizations would go bankrupt. I believe that everyone will agree with my point of view: science for the present is the only sphere of the national economy, in which people are striving to obtain a little more work and are seeking a client.

During the past year 363 laboratories, sectors, and departments "departed this life," since they had not found specific clients for their developments. True, thus far there have been no bankruptcies. But there are several reasons for this, including the presence of enormous assets in the hands of ministries, which are "fattening up" scientific collectives.

A. Sukhodayev, deputy chief of the Technical Administration of the Ministry of the Electrical Equipment Industry and Instrument Making:

I as a worker of the staff of a ministry fall into the category of managers. But in recent times it has become fashionable to regard us as a hindrance to scientific and technical progress. Nevertheless, I fully support the point of view of the State Committee for Science and Technology.

With the changeover to cost accounting science turned to face enterprises. It does not work for the shelf, but does what they order it to do. But we have been working under the new conditions only 1.5 years, yet they are already asking us for a result. It is possible to think that a ruble invested in science will immediately yield a return!

A. Ipatov, deputy director of the Scientific Research Institute of Automobiles and Automobile Engines:

We develop new models of vehicles. In a year of work on cost accounting we produced four fully unitized motor vehicles. In previous years we made one, and this was considered good! The increase of the creative activity of science is in evidence.

The representatives of other scientific organizations, who attended the meeting, seconded A. Ipatov. They supplemented his account with examples of the increased intensity of scientific labor from their own practical experience.

S. Aleshin, deputy chief of a department of the USSR Ministry of Finance:

Dear comrades, how can you depict the situation in such a rosy color? Checks show: the volume of scientific research and design work is increasing first of all due to the increase of prices, which is not backed by the increase of the scientific and technical level of developments. We visited tens of institutes. The trend is very alarming: the proportion of developments, in which inventions have been used, is decreasing, the number of inventor's certificates has declined. Developments, the level of which surpasses the world level, are practically not being stimulated.

A. Kulagin, chief specialist of the USSR State Committee for Labor and Social Problems:

Our checks also confirm the negative trend. The level of profitability is being overstated, various supplementary payments for the quality and time of jobs are being introduced. In this respect, it seems, there is no limit to the inventiveness of institute personnel.

A specific case. Three associates of the Central Scientific Research, Planning, and Experimental Institute for the Methodology, Organization, Economics, and Automation of Designing and Engineering Surveying of the USSR State Committee for Construction Affairs prepared "Tematicheskiy sbornik normativnykh dokumentov po voprosam khozyaystvennogo rascheta dlya proyektnykh organizatsiy" [A Thematic Collection of Standard Documents on Questions of Cost Accounting for Planning Organizations], having assembled in it decrees of the government and central organs. Of course, such a collection is useful, but this "scientific product" is being sold at an incredible price—more than 10 rubles a copy!

Voices from the audience:

These are regrettable exceptions! In the machine building complex at least you will not find such a thing.

S. Aleshin:

Why? Here at the Scientific Research Institute of Technology of the Automotive Institute of the USSR Ministry of Tractor and Agricultural Machine Building the annual amount of work, which is performed on its own, if you judge from the reports, increased as compared with 1987 by 2.8-fold. But if you exclude from these amounts the profit and the deductions for the budget and the funds of ministries, it turns out that the amount of work increased by only 13 percent. If you like, I can continue the examples....

V. Nikolin, chief of the Science Sector of the USSR Committee of People's Control:

It would be a big mistake not to note the negative phenomena in science. All of us expected that the changeover of sectorial science to cost accounting would ensure the acceleration of scientific and technical progress. However, thus far we have the opposite result: the share of development of new equipment in the total amount of work is decreasing, insignificant work is replacing it. Statistics confirm this.

The trouble is that the remuneration of the labor of scientific personnel is not linked with the end result, but namely with the technical level of developments and the impact from their implementation in the national economy. As a result, cost accounting has been reduced merely to the spontaneous increase of the wage.

Commentary of EKONOMICHESKAYA GAZETA

This is true. Cost accounting caused an "explosion" in the remuneration of the labor of scientific personnel.

During 1988 the average wage increased by 16 percent. At organizations of the production sectors it increased by 23 percent. The greatest increase was noted at organizations of the USSR Ministry of Light Industry—58 percent, the State Committee for Civil Construction and Architecture—70 percent, and the USSR Ministry of Trade—74 percent. At individual organizations the increase of the wage came to 95 percent.

This year the increase of the wage has continued. At institutes of the USSR Ministry of the Petroleum Refining and Petrochemical Industry, the USSR Ministry of Mineral Fertilizer Production, and the USSR Ministry of Light Industry the average wage of staff members (including cleaning women and janitors) came to 400-500 rubles. There are quite a number of institutes, at which the average monthly wage of individual personnel exceeded 1,000 rubles.

In themselves the high wage figures do not startle anyone. However, does the increase of the wage correspond to the increase of labor efficiency and the amount of performed work? The present state of our economy suggests rather the idea of the contribution of science to inflation. We will not hide it, this is worrying both central economic departments and the public.

Who Owes Whom

A. Kazakov:

The wage of cost accounting scientific organizations is scarcely more than 0.6 percent of the total amount of the paid wage for the national economy. Is it really possible to say in earnest that this 0.6 percent worsened the financial status of the country? Let us add that science is the only sector, in which the amounts of work are increasing more rapidly than the wage.

S. Aleshin:

You are overmodest, Aleksandr Ivanovich. In 1 year the wage of scientific personnel increased more than during the entire preceding five-year plan! While during half of this year it increased by another 30 percent.

A. Sukhodayev:

Is it not time to stop counting the money in the pocket of someone else? It was earned by the rules of the game, that is, in accordance with the terms of cost accounting. It seems to me that science should have received such money 5 years ago. Society got into debt to science, it is necessary to repay the debts. For the amount of scientific research and experimental design work is increasing.

Commentary of EKONOMICHESKAYA GAZETA

At various conferences people are now constantly repeating: "The windows of scientific research institutes

and design bureaus are lit up until late at night. Even on Saturday and Sunday associates hurry to laboratories and to drawing boards in order to complete started developments a little more quickly."

And, indeed, previously such zeal in scientific surroundings was observed infrequently. But the volumes of work are not an end in themselves, the result of the activity of science, the technical level and the competitive ability of our items on the world market, and the increase of production efficiency within the country are important. Not to mention the fact that what is called "the amount of scientific research and experimental design work" is only the sum of the prices, which includes the entire lot of the sometimes unfounded "turns," which appear when establishing the contract price.

What is the situation with the quality of developments?

After surveying the sectors of the machine building complex, the USSR State Committee for Science and Technology and the USSR Committee of People's Control also came to directly opposite conclusions in such a fundamental issue as the conformity of developments to the world level. While at the meeting at *EKONOMICHESKAYA GAZETA* this question, as they say, "caused excitement in the hall."

A. Sukhodayev, A. Beybel, chief of the planning and economic department of the motor vehicle testing ground of the Scientific Research Institute of Automobiles and Automobile Engines, V. Kuzmenko, director of the Dmitrov Center of the Scientific and Technical Creativity of Youth, and B. Shaykevich, chief of a sector of the Vladimir Scientific Research Institute of Tractor and Combine Engines, savagely attacked the indicator of the conformity to the world level and in general the very possibility of estimating the economic impact of a scientific or design development. "All this is a forgery. A myth!" they said. "It is necessary to evaluate scientific research institutes, just as enterprises, according to the profit which they derive per ruble of expenditures, per ruble of capital. Plants will not pay for a product which they do not need!"

Commentary of *EKONOMICHESKAYA GAZETA*

Let us recall that the new economic mechanism was also based precisely on this certainty ("industry will adopt only the most advanced developments which have been made at the highest level"). But in practice they are also taking not the best ones and they are paying generously for them.

Considerable assets have been accumulated in the funds of scientific, technical, and social development of many enterprises. A portion of them was received by the unfounded overstatement of the prices for their products. The money, which was received without great efforts, is being spent just as thoughtlessly. On scientific developments that will be used nobody knows when; on designs of construction projects that will be started nobody knows when. Thus far cost accounting has not

begun to work at full capacity in industry, clients continue to be very undemanding toward the scientific and technical product. Many enterprises are striving to produce items, which would yield an immediate increase of the profit, and are not directing attention to the future. They place orders of this sort with scientific research institutes. Industry frequently sends orders for developments of the past, the participants in the business meeting noted.

A. Sukhodayev related that scientific organizations of the USSR Ministry of Instrument Making, Automation Equipment, and Control Systems several years ago made prototypes extensively out of the latest materials, which ensured the items the highest technical level. At scientific research institutes they put them on the shelf, because the USSR Ministry of the Electronics Industry was unable to supply plants of the Ministry of Instrument Making, Automation Equipment, and Control Systems with such materials for the series production of products. Now the institutes are working mainly on the orders of enterprises, and their shelves have become noticeably empty: the enterprises are directing attention to the materials (not the most advanced ones), the acquisition of which they are sure of. As a result science, instead of advancing, is beginning to retreat.

Commentary of *EKONOMICHESKAYA GAZETA*

Judging from the volume of the contracts, which have been concluded with planning institutes, an industrial construction boom awaits us. However, we know that its sharp reduction is being planned in the country. Obviously, many designs will lie on shelves and inevitably will become obsolete.

Thus, State Planning Institute No 2 of the USSR Ministry of Light Industry prepared the working documentation for 16 new projects of 1989 with a cost of 37 million rubles, of which only 3 projects for 5.2 million rubles were included in the construction plans.

A generous wage was paid for the designs. Though its sum on the scale of the country is only a thin brook. But it also replenished the river of depreciated rubles which have now flooded the national economy.

A. Beybel:

In the council of the labor collective they asked me a question: If we have unearned money, who specifically did not earn it? People are simply indignant, they say: What did we do, steal it? And from whom? Show us!

Commentary of *EKONOMICHESKAYA GAZETA*

The present situation once again confirms that all the steps, which are being taken on the improvement of the remuneration of labor, should be thought over many times. The improper organization of the remuneration of labor entails not only economic, but also moral losses. The workers of science, who for a long time were "on

short rations," began to appreciate the taste of a lot of money. All the arguments and facts of inspecting organs only irritate them.

The All-Union Conference, which was held in the spring of this year under the aegis of the USSR State Committee for Science and Technology, comes to mind. The workers of science listened in respectful silence to the praises addressed to them. The hall began to buzz with excitement when the same speakers attempted to cite examples of the extremely low return from the investments in science. They "dismissed" from the rostrum the representative of the Ministry of Finance, "began to applaud" the representative of the State Committee for Statistics, and to general applause declared the State Committee for Labor and Social Problems an obstacle to scientific and technical progress. It is possible to understand this reaction: If a person has quickly become accustomed to receiving 900 rubles a month, how is he going to hear that he "made" only 250 rubles?

In the spring the Collegium of the USSR State Construction Committee consider the questions of the remuneration of labor at scientific and planning organizations. The collegium recommended the examination of the question of the conformity to the held position of the executives of several institutes, where wages had increased especially rapidly. While the directors themselves had received 10,000-14,000 rubles of lump-sum payments each "according to the coefficient of labor participation." It was a matter of the loss of conscience—a purely moral indicator. For everyone it was obvious: such wages are excessive and do not conform to the labor efforts and the results of the work of the collectives. But the most fastidious inspectors did not find a crime in the actions of the administration, everything was done "according to the law."

The participants in our meeting were unanimous: a serious defect of the economic mechanism, which is in operation in science, consists in the fact that it makes it possible to increase the wage of personnel sharply without regard for the results of their labor.

What channels do this large unfounded payments take?

...From the Munificence of Ministries and Clients

A. Kazakov:

The groundlessness of the standards of the formation of the wage fund and the distribution of the profit, which have been established by ministries, is the main cause of undeserved payments. Thus, in the USSR Ministry of Ferrous Metallurgy last year a profit at the level of 30 million rubles should have been derived from the sale of scientific and technical products. It actually came to 32 million rubles. Nevertheless, the economic stimulation funds increased by nearly twofold. Why? Because the standards of the distribution of the profit were formed in such a way that a large portion of the assets went into the

material incentive fund. According to the plan its amount came to 9 million rubles, in practice it was 18 million rubles!

A. Leporskiy, chief economist of the All-Union Scientific Research Institute of Electromechanics:

We have a similar picture. The ministry reported to our scientific research institute the following standards: 70 percent of the profit is deducted for the material incentive funds, 30 percent is deducted for the fund of scientific, technical, and social development.

Voices from the audience:

Disgraceful!

A. Leporskiy:

We ourselves also understood that it is disgraceful. We addressed to the ministry the request to revise the standards. They replied to us that in conformity with the USSR Law on the State Enterprise the standards should remain stable until the end of the five-year plan. Then we decided ourselves to "slow down": we spent only 25 percent of the material incentive fund.

Very many similar examples were cited at the meeting. The former USSR Ministry of Construction in Southern Regions of the USSR envisaged for its own scientific organizations deductions for the fund of scientific, technical, and social development in the amount of 0.8-3.5 percent of the profit; all the remaining assets are for the remuneration of labor. What is surprising in the fact that the wage at these organizations suddenly increased by 80 percent?! Many ministries displayed steadfast "respect" for the Law on the State Enterprise, not having revised in good time the obviously absurd standards. More simply put, they continued to fatten up their own organizations. Is that not why in our country not one, even the weakest institute has also not gone bankrupt? Not even one of those which on the eve of the introduction of cost accounting were quite ripe for closing owing to their total unproductivity.

Let us note, incidentally, that "easy money" turned the heads of far from all the executives of scientific organizations. Many executives acted as they did at the All-Union Scientific Research Institute of Electromechanics.

V. Zuyev, deputy general director of the Spektr Scientific Production Association:

We have an average wage of 350 rubles, but could pay 700-800 rubles. We are aware: obviously something is wrong. We put the unpaid wage into personal computers so that no one would have temptations.

Commentary of EKONOMICHESKAYA GAZETA

According to the data of statistics, now in half a year the average wage in science has increased by another 30 percent, while at planning institutes it has increased even by 140 percent! If just as last year an adequate increase of

the real product is not behind this growth, about what saturation of the market can one speak?

No, it is naive to try to solve the problem by the universal increase of the consciousness of executives of scientific research institutes. It is time to critically examine without delay the mechanism of the formation of the assets for the remuneration of labor.

The introduction of contract prices contributed to the "explosion effect" in the remuneration of labor. In the opinion of the USSR State Committee for Science and Technology, contract prices are often blamed undeservedly: the wage increased by not more than 20 percent owing to their overstatement.

Nevertheless, many of our readers propose to regulate pricing, at least in the form of procedural recommendations.

B. Shaykevich:

As soon as we introduce them, we will put an end to cost accounting....

A. Zemtsov, deputy general director of the Avtoelektronika Scientific Production Association:

The practical experience of all civilized countries testifies: one should not regulate pricing very vigorously, in spite of the costs that exist in this area in connection with the imbalance of the market of scientific and technical products and with the unnecessary monopoly.

At our scientific production association the foreign practice of forming contract prices was analyzed. We devised recommendations which are enabling our developers to determine by calculations the share of the profit of the client of our scientific and technical products. One department (19 people) concluded a contract with an enterprise of the Urals for the production of on board computers. In conformity with the contract for several years this department will receive 1 million rubles annually from the sale of such products. I believe that it is now possible to recommend such a practice to many scientific organizations.

V. Zuyev:

Of course, one ought to take into account in the price the impact obtained by the client from the introduction of our development. We conducted an interesting experiment. Last year we wrote letters to all the clients: let us know, please, what became of our scientific and technical development. Is there some kind of impact—economic, social? A third responded. Two-thirds refused altogether to respond: they say, what business is it of yours, we paid you the money, and you leave us alone! Now we have again written letters. But I am sure that half will not respond. Should a report on the use of scientific and technical developments, perhaps, be introduced?

Voices from the audience:

It is useless! It has already been done. They will write in this report everything you want.

V. Zuyev:

I can guarantee today that enterprises have not put on the shelf only the developments which were completed in accordance with the contracts, in which it is recorded that the enterprise will transfer the profit to me. But in practice it is the good will of the enterprise to pay it or not to pay it. Today a handful are agreeing to the deduction for us of a portion of their profit. But it is a pity—this would have been the best counteraction to the overstatement of prices.

A. Kazakov:

Zuyev is talking about the principle of "royalties." All the developed countries operate on this principle. In order for the principle of "royalties" to be implemented in our country, it is necessary to permit the enterprise before beginning the formation of their funds to deduct a portion of its profit for the institute. The present Model Statute allows this to be done only with respect to jobs that were contracted before 1988. After the changeover to cost accounting such a possibility disappears. Where is the logic? For more than a year we have not been able to correct this line.

S. Aleshin:

Well, what do you want? To preserve the contract price and to receive in addition deductions from the profit of enterprises?

A. Kazakov:

If the price is determined according to the principle of "royalties," it will no longer be a contract price.

Commentary of EKONOMICHESKAYA GAZETA

The advantages of the principle of "royalties" have been confirmed by world practice. Apparently, it makes sense to look carefully once more at the possibilities of its use under our conditions.

Cooperatives Appropriate Ideas

The participants in the business meeting directed attention to the following thing: the statistics of the "takeoff" of the wage at scientific, design, and planning organizations do not take into account another very significant component: the earnings of scientists, which are received simultaneously at cooperatives. For the mass establishment of scientific technical cooperatives began at the same time as the introduction of cost accounting. A noble goal was being pursued: to weaken the monopoly of scientific research institutes.

"But here is the paradox—there are many cooperatives, but it is simply ridiculous to speak in earnest about the breakup of monopolies in science," A. Kulagin said. "Together with the centers of the scientific and technical

creativity of youth and the organizations of the All-Union Society of Inventors and Efficiency Experts cooperatives performed approximately 40 percent of the amounts of work of state organizations. The standard of the formation of the wage fund there is approximately twofold or else 2.5-fold higher. Hence, money in the total amount of about 80 percent of the wage fund of all state scientific organizations was transferred to these organizations from the development fund of state enterprises. But practically the same people, who work at institutes and at the same time at the cooperatives, which were established under these institutes, received it. It is impossible to calculate their real income. If this process were accompanied by a real increase of the scientific and technical output, there would be no objections. But for the present, as checks show, the majority of cooperatives are not developing a new product, but are transferring to someone a product that was already developed by someone. In my opinion, this is grounds for serious hesitations."

A. Zemtsov:

We deliberately stimulated the establishment of cooperatives under our organization. Seven or eight cooperatives are operating permanently here. Unfortunately, the cooperatives did not develop, as we expected, competition among themselves. They divided spheres of influence and established the monopoly of developers to a specific direction of scientific research.

V. Zuyev:

As a rule, mainly associates of a state scientific organization work at a cooperative. And not always conscientiously. Some started jobs, which are being financed by state enterprises, are taken and are included in a completed theme, which the cooperative then sells. But this is the appropriation of the property of state scientific organizations and its intellectual capital. We have also encountered the fact that at times cooperatives contrive to write off their expenses to themes, which are being performed in accordance with state orders or are being financed by a state enterprise. Of course, creative labor does not lend itself to strict standardization, but it is necessary to correct substantially the legal principles in this sphere!

A. Zemtsov:

Correct. Moreover, at once. The right to own scientific and technical documentation and to use it is not set down and is not protected in legislation. And this is the cause of the universal theft by cooperatives of the property of state scientific organizations.

V. Zuyev:

Unfortunately, the practice of arbitration in our country is oriented toward the interests of industrial enterprises. While arbitration, in essence, does not exist in science. The turning of scientific organizations to arbitration on

analogous questions is rebuffed. Precisely because the liability for the violation of property rights is not clearly stipulated in the legislation.

A. Ipatov:

I believe that we are acting simply incorrectly by attempting to forbid both cooperatives and enterprises to do something. We must not forbid! It is necessary to place cooperatives and state organizations under equal conditions.

S. Aleshin:

The fusing of the state and cooperative mechanism is a promising idea. It is possible to achieve this, provided taxation is introduced in science.

The introduction of a standard ratio of the wage and income proved to be ineffective. The collectives, whose honestly earned money was frozen in bank accounts, suffered. In the opinion of the meeting participants, the tax on the fund for the remuneration of labor, which is being put into effect on 1 October, also might not yield a real impact, if the very mechanism of the formation of this fund remains unchanged. But what is it then necessary to do?

V. Zuyev:

To introduce progressive taxation of the income of collectives—nothing more is necessary. It is another matter not to make a mistake in the amount of the taxes, as they did with the standards. Our scientific production association participated in an experiment, which the USSR State Committee for Science and Technology began. In accordance with its conditions three-channel taxation is envisaged: a revenue or profit tax; the taxation of funds; an income tax on personal earnings.

All the meeting participants share the opinion of V. Zuyev about the necessity of progressive taxation. But our own experience in this area so far has been unsuccessful (let us recall the scale of the taxes on cooperatives), while foreign experience testifies: taxation is not only an effective, but also a capricious tool; it is necessary to use it very skillfully. It will be possible to draw the first conclusions after the completion of the experiment, in which more than 100 organizations are participating and in which several versions of taxation are being used. But it is probably incorrect to see in taxes a panacea.

A. Kazakov:

We have managed to develop an entire series of economic mechanisms—in sectorial science, in the defense, academic, and nonproduction spheres. Plus cooperatives, centers of the scientific and technical creativity of youth, and organizations of the All-Union Society of Inventors and Efficiency Experts—everywhere the economic mechanism works differently. This supposedly reflects the specific nature of scientific and technical

labor in different spheres of the national economy. But in reality it only expresses the aplomb of the corresponding departments.

For example, at a sectorial scientific research institute an associate is dealing with the problem of control. Why should the criteria in the evaluation of his activity be changed only because, having crossed the road, he will deal with the same problem at a defense institute?

Science needs a unified economic mechanism! We will face the truth: we will not be able to develop it at once. However, it is necessary to constantly bring the economic systems of different spheres of science closer to each other, to take the best experience, which exists today in real practice, and to make it accessible to all scientific collectives.

Thus, the first results of the work of scientific institutions under the conditions of cost accounting are contradictory. Their activity has been stepped up somewhat. But the results of the labor of many collectives are far more modest as compared with the rapid increase of their income. Apparently, the economic mechanism in this area requires serious readjustment.

At the same time it must be realized—it is impossible to improve the economic mechanism in science without improving it in the national economy as a whole. It is possible to invent for science any elegant systems, but they will not be effective until enterprises display demandingness toward the developments being offered to them and until they “grudge” paying for documentation that they do not need very much.

The lack of legal protection of institutions before their own personnel, who through the combining of jobs work at cooperatives and shamelessly sell through cooperatives the fruits of the collective labor of a scientific research institute or design bureau, is also contributing considerably to the large unfounded payments.

These questions require immediate settlement.

Financial Incentives to Use New Technology

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[Article by P. Sedlov, lead scientific associate of the Institute of Economics of the USSR Academy of Sciences under the rubric “Scientific and Technical Progress”: “The Increase of the Interest of Enterprises in the Assimilation of New Equipment”]

[Text] The task of achieving the highest world level in the most important types of machines, machinery, and instruments presumes the rapid development and assimilation of new highly efficient equipment. However, during the period of its assimilation (1-3 years) it is, as a rule, unprofitable for enterprises, since their activity is evaluated according to the indicators of the increase of labor productivity, the production volume, and the profit. The higher labor intensiveness due to the lack of

assimilation by manufacturers of technological and labor processes, which are new for them, the lack of development of efficient means of using raw materials and materials, the higher amortization and power consumption, which are connected with this, and so on are the reasons.

It is also necessary to add to this the shortcomings of the economic mechanism, which orients enterprises toward the fulfillment of the current production plans, the lack of stimuli for the use of the achievements of scientific and technical progress, and the imperfection of the economic organizational levers of the introduction of innovations. As a result the amount of newly developed equipment is decreasing. Whereas during the 10th Five-Year Plan on the average 3,700 models of new types of machines, equipment, apparatus, instruments, and means of automation were developed annually, during the 11th Five-Year Plan respectively 3,500 were developed, in 1986—3,100, in 1987—2,700, and in 1988—2,200.

At the same time the share of items of machine building, which have been assimilated for the first time in the USSR, in the total volume of commodity production is increasing. The point is that the increase of the prices for new equipment increases its volume and accordingly the share with an invariable number of objects, thus distorting the actual result.

According to the data of the USSR State Committee for Statistics, in 1988 the updating of products in the machine building complex came to 11.4 percent with a plan of 9.2 percent. But the state order on the delivery of the most important types of new items was not fulfilled. How is it possible to link the exceeding of the planned modernization of machine building products in case of the disruption of the delivery of their most important types with the task of achieving conformity to the world level in the immediate future? Will machine tool building, the automotive industry, and agricultural machine building be able to accomplish this task?

The increase of the productivity of national labor in many respects depends on the efficiency of the use of productive capital. The constant maintenance of its active portion at a level, which corresponds to the scientific and technical development of society, by the regular replacement of means of labor and technological processes and the extensive introduction of the achievements of science and technology is an especially important factor.

The replacement of fixed production capital can be effectively in case of the observance of the following requirements. Durable means of labor should be developed at a high technical level. New equipment should be truly new, it is inadmissible to include in it objects that repeat what has been achieved. It is a matter only of the development of new means of labor, and the proposed requirement by no means conflicts with the duplication of advanced equipment which is being allocated for the

replacement of worn out equipment. New means of labor should yield without fail an economic impact in case of use by the consumer, which is provided by the decrease of the cost of the product made (work performed) with their use or by the increase of quality. The retooling of sectors should be carried out in accordance with special goal programs, which follow from the Comprehensive Program of Scientific and Technical Progress for 20 Years and take into account the necessity of increasing in the established time the technical and economic level of the output being produced and the technical level of production. And, finally, the last requirement consists in the assurance of the interest both of producers of new equipment in its assimilation and of consumers in its acquisition and the constant timely updating of the production apparatus.

The pace of scientific and technical progress depends on the speed and quality of the development and assimilation of innovations. But, unfortunately, thus far there is no official concept "new equipment" [novaya tekhnika]. In the Method of Determining the Economic Effectiveness of the Use in the National Economy of New Equipment, Inventions, and Efficiency Proposals (1977) everything, from inventions to measures that improve the production indicators, provided they have been included in the corresponding plans, is grouped with it. In essence, the right has been given to the personnel, who formulate and approve the plans of the development of science and technology, to specify subjectively in each individual case what new equipment is. The Method is the only document, in which an attempt is made to explain this category, but with the stipulation: the definition pertains only to cases of the calculation of the economic effectiveness.

Such a situation had the result that inventions are being used in only a third of the themes of the plans of the assimilation of new types of products and advanced technology. Consequently, the bulk of the themes repeat what is already known. On other words, if an item being newly developed is based on a decision, which, though still advanced at present, is already known, after its assimilation in production it lags at least 5-7 years behind the latest achievements in this area.

According to the data of foreign scientists, the period of the obsolescence of equipment by the middle of the 1980's had decreased to 7-9 percent. While the average time of its development and assimilation in our country is 5-7 years. Hence in many cases obsolete equipment is being produced.

The basic causes of such a situation consist in the poor use of inventions and in the shortcomings in the economic mechanism. Of all the used inventions 85 percent are introduced at one enterprise. Those yielding a significant economic impact (100,000 rubles and more) are also used primarily at one enterprise. Moreover, about 60 percent of the inventions, which have been included in objects of equipment, were developed more than 10 years ago, while 15 percent were developed from 15 to 30

years ago. This means that objects, which were developed with the use of inventions, are shown in the reports, but obsolete decisions are actually included in them.

With allowance made for what was said above it seems necessary to establish precise requirements for the grouping of objects with new equipment. In our opinion, it is advisable to group with it means of labor, objects of labor, and technological processes for production engineering, cultural, and household use, which are being newly developed and assimilated in production, have a socioeconomic impact, and in technical level surpass the best world achievements.

Only equipment, which has not yet existed, should be planned, financed, and stimulated as new equipment. This does not mean that equipment a level lower should not be produced. A product, which does not surpass, but does correspond to the best achievements, meets the needs of the national economy. But it is not new. The planning, financing, and stimulation of its production should be carried out within current production, without the application to such items of the procedure that has been established for new equipment.

Enterprises have acquired much independence in planning. However, there are no stimuli that induce them to seek new equipment and to include it in the plan. Apparently, it is possible to increase the interest in its assimilation, having used the economic mechanism for this and having increased the prestige of state orders, which should become economically more profitable than other jobs.

The assimilation of new equipment adversely affects the cost accounting indicators and financial position of enterprises. Thus, during the period of the assimilation of the 2E450AF1 NC jig-boring machine at the Moscow Plant of Jig-Boring Machines the sale of this product yielded a profit only in the 3rd year of its production, moreover, one less than the standard profit.

Unprofitability is also due to the poor organization of work during the period of the assimilation of new equipment. Therefore, it is possible to increase the interest of collectives of enterprises in it only on the basis of an economic mechanism, which ensures the profitability of equipment, which is of a high level and is needed by production, while simultaneously eliminating poor management. The improvement and the strict observance of the standards, which are used at the enterprise, are of main importance in this. It is important to follow particularly carefully the standards of the expenditures on the assimilation of new equipment. The expenditures will be objectively higher, but they should also be objectively necessary.

Changes in the economic mechanism are expedient for the increase of the interest of enterprises in the assimilation of new equipment. The comparison of the results with the expenditures is the basis for cost accounting, under the conditions of which the majority of enterprises are now operating. In this way it is also possible to

evaluate the results of scientific and technical progress. But the periods (a quarter, a year), which have been taken for the evaluation of economic activity and the crediting of economic stimulation funds, are not suitable with respect to scientific and technical progress. Results of the introduction of innovations, which are comparable with the expenditures, cannot be obtained during these short periods. The achievement of an impact from the sale of new equipment, which would ensure the corresponding deductions for the state, the repayment of loans to the bank, and the formation of well-founded economic stimulation funds, goes beyond the 1-year review period. In order to eliminate such a negative factor, it is necessary to lengthen the planning and review periods, to grant enterprises greater independence in planning, to apply long-term economic standards, and to use credit actively.

In the USSR Law on the State Enterprise it is stipulated that the five-year plan (with a breakdown by years) is the main form of planning, while the long-term economic standards are stable for the five-year plan. It is important that the breakdown by years would be made by the enterprises, which, when calculating the indicators for each year of the five-year plan, could take into account the effect of the assimilation of new equipment on labor productivity, the production volume, and the amount of profit. They should have the right to reduce in the plan the assignments for individual years of the five-year plan, if this is due to the effect of the assimilation of new equipment, while increasing them accordingly during the other periods, in order to ensure the fulfillment of the five-year plan that was adopted by them. It is possible to leave without reduction the amounts of the deductions for the state budget and for economic stimulation funds. For the making of such deductions in the planned amounts one should use credit with the repayment of the loans during the last year of the five-year plan or (in case of equipment with a long payback period) during the year of completion of the planned period of assimilation.

Instead of the financing of the increased costs of the assimilation of new equipment by means of internal working capital, the fund for the development of production, science, and technology, reserves, and centralized funds it is also advisable to use credit. As a result it will become possible to raise cost accounting relations to a higher level for the stimulation of scientific and technical progress. At the same time accounting standards of the expenditures on assimilation, which are scientifically substantiated and are tied to the profit of future years and the long-term standards of deductions of a portion of it for economic stimulation funds, are needed. This will make it possible to calculate the necessary amount of the loan, which ensures the financing of operations on the assimilation of new equipment and does not infringe upon the interests of society and the enterprise. The loan, the amount of which is close to the socially necessary expenditures on assimilation, should be repaid from the profit of the enterprise, which was derived as a result of the sale of this equipment in the set time. Moreover,

it is necessary to guarantee the enterprise the formation of incentive assets by means of a portion of the same profit and society the increase of the national income.

Credit should also be used extensively for the enterprising, unplanned development and assimilation of new highly efficient equipment. In this case it is advisable to repay the loan at the end of the period of assimilation and not from the production development fund, but from the profit that was derived from the sale of the product which was developed by means of the loan. Such a procedure will significantly increase the interest of enterprises in the assimilation of unplanned new equipment and will help to unleash the initiative of innovators.

It is important to determine the price for new equipment during the first 2 years of its assimilation on a contractual basis, using as the base the actual standard production cost of the first and (separately) second years of assimilation. It is possible to take as the basis of profitability its value, which is planned for the period of mass production, starting with the third or, in individual cases, the fourth year of production. The only condition is that the cost of a unit of the main parameter for the user as compared with the equipment being replaced is not to be exceeded.

As for the economic impact that is derived in the national economy in case of the use of a new product, it is taken into account in pricing. In conformity with the prevailing procedure 70 percent of the economic impact is included in the price for a new machine building product. With the mastering of the rated indicators of the obsolescence of items and the decrease of the production cost the prices should be reduced.

Such an approach to the determination of the prices for a new product for production engineering purposes is justified. However, it is necessary to change their base, that is, the price of the analogous item being replaced, which includes all the unnecessary expenses that are due to the past poor organization of production. It is also important to revise the methodology of determining the limit price, which should reflect the decrease of the cost of a unit of effective impact for each model being newly developed and assimilated. In case of the establishment of the wholesale prices for new items, particularly machines and equipment, it is necessary to provide for the reduction of their level per unit of effective impact even under the conditions of some objectively dictated increase of the prices for raw materials and materials.

Unfortunately, the growth rate of the prices for new equipment frequently surpasses considerably the growth rate of its performance, while the cost of a unit of effective impact does not decrease, but increases. For example, a price of 256,000 rubles was established for the VL-10 electric locomotive, while the new model, the VL-15, began to cost 915,000 rubles, that is, 3.6-fold more, with an increase of the power by only 1.7-fold.

In order to halt such a faulty practice, the calculation and consideration of the indicator of the specific cost of a unit of effective impact should be introduced in the system of the monitoring of the designing of new items and in the procedure of establishing the prices for them. This indicator, which can be called the coefficient of the specific cost, is defined as the ratio of the specific costs of a unit of effective impact for the new and base items. The specific cost is calculated by dividing the wholesale price (the one planned for the new item and the prevailing one for the base item) by the value of the basic parameter (power, capacity, and so on) in the appropriate units.

The coefficient of the specific cost can be used successfully in the planning and stimulation of the decrease of the production cost of new items at all the stages of their development and assimilation, starting with scientific research and up to series production, but without fail when approving the technical assignment, when making the decision on the delivery of the new equipment to production, and when establishing the price. The value of the coefficient should be less than 1 and be reduced for each new model as compared with the based model.

Thus, new equipment should have a technical level and efficiency, which make it possible to establish for it a price, which is advantageous for both the producer and the consumer. The high efficiency of new means of labor will provide the producer with a larger profit than will the production of the equipment being replaced. At the same time the consumer will derive, in turn, a larger profit than in case of the use of the old equipment.

At the same time for the increase of the interest of enterprises in the assimilation of new equipment which surpasses the best world achievements, it should be established that deductions are not made to the budget and to the superior organ from the profit which is derived from the sale of such a product during the first 2 years of production. In other words, the entire profit from new equipment of a high technical level for 2 years is left to the enterprise.

It is also advisable to extend this break to a product that is being produced for the first time in accordance with state orders. However, if its level is lower than the named level, assets should be deducted to the budget and the superior organ, but in accordance with the standard that has been reduced by 50 percent.

As a whole for industry the deductions to the budget from the profit (the tax on the profit), which has been derived as a result of the sale of a product that corresponds to the best world models, should be made in accordance with established standards. It is necessary to reduce the standards of the deductions from the profit to the budget for items that surpass in technical and economic level the best world scientific and technical achievements. The deductions to the budget for a product, the level of which is less than that of world models, should be of a higher amount.

In the speeding up of the "science-production" cycle the closer integration of all the participants in this process plays an enormous role. In the United States, for example, a system of contracts and agreements between clients and performers, in which the interrelations among researchers, developers, and production workers are coordinated, is being used; 77 percent of the federal operations in the area of innovations are performed on contracts, in which the specific assignments for each cop performer, the mutual obligations and liability, the deadlines of the completion of jobs, and the material incentive are stipulated.

In this connection let us note that our proposal on the sharing of scientific organizations in the profit from the introduction of developments is aimed at the evaluation of the end result, which was obtained in the national economy, and the rewarding of each cop performer subject to the results of the activity and his contribution to the common job. Such a procedure fits in with the contract system.

It would be advisable to prepare the Statute on the Contract for the Fulfillment of a State Order, which envisages the regulation of the interrelations of the participants in the fulfillment of any program, the procedure of financing and material and technical supply, the obligations and liability of the cop performers, the deadlines of the completion of all the stages, which lend themselves to evaluation, and the terms of material stimulation. The experience of the performance of contractual jobs should be used when developing the diagram of contractual relations.

A contract system of the performance of jobs in the area of scientific and technical progress, which is based on cost accounting relations, will help to achieve the closer integration of science and production and to speed up the development of highly efficient equipment and technology.

The necessity of the rapid assimilation of new equipment is attributable to the fact that the productive capital, and first of all its active portion, is very worn out, moreover, the updating of equipment is slowing down.

The share of the retirement of fixed production capital is extremely low. During the 10th and 11th Five-Year Plans it came to less than 2.5 percent. The average service life of equipment in industry (with allowance made for capital repair) is 28 years. Along with this a significant portion of it is retired ahead of schedule. The reason is poor quality and the lack of the necessary operating and storage conditions. In the middle of the 1980's more than 11 percent of the equipment (by cost) was written off ahead of schedule.

The aging of the active portion of the fixed production capital has also affected the structure of the output being produced. The share of items, which have been produced for more than 10 years by enterprises of the machine building complex, increased in the total volume from 19.5 percent in 1970 to 30.4 percent in 1986. The lack of

a cost accounting interest of enterprises in the improvement of their production apparatus and in the replacement of old equipment with new equipment played a significant role in the slowing of the process of updating the fixed production capital.

Depreciation policy is of great importance for the updating of the production apparatus. The norms of depreciation, which were established in 1975, specified a service life of machines of 14.2-14.4 years. This exceeds the term of obsolescence by nearly twofold. However, the data on the retirement of machines and equipment testify that the actual service lives were much longer than the standard service lives.

Scientists and experienced workers are advancing proposals on accelerated depreciation, which provides for the increase of the annual depreciation deductions during the first years of use of machines and equipment and their reduction during the last years, before they are written off. Thus, it is proposed that two-thirds of the depreciation deductions should be credited to the first half of the service life. This is a progressive procedure. The rapid accumulation of the depreciation fund makes it possible to improve the financial status of the enterprise when updating and modernizing the stock of machines and equipment. Under the conditions of full cost accounting and self-financing this is of particular importance.

The combined use of accelerated depreciation with breaks on the payment to the budget for fixed production capital plays a substantial role. It is important to consider that the introduction of new equipment and technology increases the value of the fixed capital of the enterprise. Therefore, payment for it in accordance with a single standard (for both old and new fixed capital) increases the amount of the deductions to the budget and decreases the profit of the enterprise that is updating equipment and technology. Accordingly the introduction of new equipment also affects the other cost accounting indicators.

It is advisable to establish for 2-3 years preferential standards on the payment to the budget for the enterprise that has updated the fixed production capital. Moreover, they should be differentiated subject to the rapid assimilation and intensive use of new capacities. The portion of these deductions, which has been left to the enterprise, together with the increased depreciation deductions will enable the enterprise to accumulate assets quickly for the improvement of production.

Interesting experience in the area of the stimulation of the technical improvement of production exists in the United States. What is called an "investment tax credit" is in effect there. It consists in the fact that a break on the tax on the profit in the amount of 6-10 percent of the total value of the capital investments in machines and equipment is established for the enterprise and the firm.

Firms use these assets for the increase of the technical level of the equipment and technology being used and for scientific research work.

It seems advisable to plan the development of sectors jointly and in interconnection with respect to the product and the technological level of production, which ensures the assimilation of new items. In intersectorial comprehensive programs of the development of the sectors of industry it is necessary to establish specific technical and economic levels of the product and production (the technology, the fixed production capital). It is necessary to plan achievement by calendar periods.

The programs should be intersectorial ones, that is, ones that envisage in a single complex operations that are performed by different sectors on the development of, for example, ferrous metallurgy or the automotive industry and agricultural machine building. The retooling of production in the area of the updating of equipment prior to its inclusion in technological lines, that is, production start-up, should be carried out by enterprises of the manufacturing sector.

Thus, the validity of comprehensive goal programs, which include the development and assimilation of new types of equipment, will be extended until its introduction at the consumer's. This will help to balance more accurately the needs for equipment with its production and to shorten the time of the introduction and the achievement of the rated indicators of new machines.

In goal programs it is important to provide for the complete resource supply of the development, assimilation, and introduction of new equipment at all stages and phases, including the creation of the necessary reserves. It is expedient to carry out the material supply of such operations, which cannot be met by wholesale trade, through orders of supply organizations, which are common for the entire program.

As the reference base when formulating the program of the retooling of sectors one should use service lives of items and deadlines of the removal of models of production, which are established in a standardized manner, and the periods of the updating of products and the production base by sectors, which are envisaged in the Comprehensive Program of Scientific and Technical Progress for 20 Years. Apparently, it is expedient for the State Committee for Science and Technology and the USSR State Planning Committee to draft and approve general instructions on the establishment of the service lives of items and the deadlines of the removal of models from production.

It is necessary to study and use in our practice available foreign experience. For example, in the GDR for many types of industrial products standard periods of their production, at the basis of which are norms of updating, have been introduced since 1986. Upon the expiration of the standard period of production the prices for items are reduced, due to which the profit from their sale also decreases. The standards of the updating of production

are differentiated. On the average in a year throughout the national economy 30 percent of the products should be updated, while 40 percent of the consumer goods should be updated. These norms have not yet been achieved by everyone, but there are already combines, the updating of products at which comes to about 30 percent.

The established service lives of items will serve as the base for the determination of the rates of depreciation. The latter should be actively involved in the management of the national economy. Now it is still poorly linked with other levers of economic management.

It is necessary to supervise strictly the observance of the set dates of the completion of the service of items and the dates of the conclusion of the production of models. These standards can influence the updating of production.

In some cases the updating of the active part of the fixed capital can be carried out not on the basis of the change of models of equipment, but on the basis of the modernization of operating machines, machine tools, equipment, and so on. The decision on the modernization of items during the period of their use should be made by the developer in consultation with the consumer when forecasting the development of this type of equipment and be indicated in the passport with the setting of the date of its accomplishment. The technical content of modernization should be determined with the participation of the consumer.

Modernization should be carried out by the manufacturing plant in an industrially manner, and not in an amateurish manner by every consumer, as is being done at present. Such modernization can be carried out with respect to the entire stock of the given model at a uniform high technical level and can serve as the basis for the extension of the service life of an item.

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New Financing Laws Create Problems for Introducing New Technology

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[Article by Deputy Chairman of the State Committee for Inventions and Discoveries Yu. Pugachev and E. Bunatyan, chief of a subdepartment of the State Committee for Inventions and Discoveries, under the rubric "Scientific and Technical Progress": "The Problems of Invention Under the New Conditions of Management"]

[Text] Soviet inventions are making a significant contribution to the development of the economy of the country and its scientific and technical potential. They make up 74 percent of all the inventions, which are registered in the CEMA member countries, and 16 percent of the

world number. The annual economic impact in the national economy from their use comes to 3.7-3.8 billion rubles.

At the same time the level of domestic invention does not meet the requirements of the socioeconomic development of the country. In recent years stagnation phenomena have appeared in this sphere: the growth rate of its indicators not only has slowed down drastically, but in a number of cases has begun to be characterized by negative dynamics—first of all in the area of the organization of the use of inventions and the mass nature of inventors' creative.

During 1986-1988 fewer applications were submitted, fewer inventor's certificates were issued, and fewer inventions were used and patented abroad than during 1980-1983. Thus, in the machine building complex in 1988, as compared with the preceding year, the number of submitted applications decreased by 9.5 percent, the number of developed inventions decreased by 7.7 percent, the number of those used for the first time decreased by 7 percent, and the economic impact from their introduction in production decreased by 8.6 percent.

The share of Soviet inventions in the world fund is declining. In recent years a genuine invention boom with the gigantic growth rate of innovations in the testing and industrial use of new highly efficient technical solutions has been observed abroad. In our country they are being used and disseminated, as before, with difficulty, slowly, and frequently also painfully, remaining the weakest link of the "science-technology-production-application" cycle. At times extraordinary steps are necessary in order to "push through" the introduction of innovations, the enormous benefit of which is obvious. Enterprises today not only are not pursuing them, but are also resisting them on any pretext.

It should be regretfully stated that the worsening in the last 3-4 years of the basic indicators of the state of invention and of its influence on the technical level of production and the competitive ability of the products being manufactured runs counter to the pursued policy of the rejection of administrative command methods of the management of the economic activity of enterprises, to their changeover to self-financing, and to the increase of economic independence.

Thus, the hopes that the changeover of the economy to the new economic mechanism should be accompanied by the activation of inventive activity, while the state (cooperative) enterprise will regard it as the most important means of achieving the largest profit or cost accounting income, thus far are not being realized.

Along with this in some units of the national economy of the country the new cost accounting mechanism has gradually begun to affect the nature and direction of the use of inventions. The perestroika of foreign economic relations, which is being carried out, and the implementation of the decrees of the CPSU Central Committee

and the USSR Council of Ministers, which provide for their transformation, have stimulated somewhat the patent and licensing activity of enterprises and organizations. In particular, in the machine building complex the number of inventions, which were sent for patenting in 1988, increased by 1.7-fold, including by 3.7-fold for the USSR Ministry of Chemical and Petroleum Machine Building and by 2.8-fold for the USSR Ministry of Agricultural and Tractor Machine Building. In 1988 the enterprises and organizations of the machine building complex concluded 173 licensing agreements, or 45 more than during the preceding year. Having the largest increase of the number of sold licenses are the USSR Ministry of the Electrical Equipment Industry (on the basis of the goal-oriented licensing activity of several of its organizations), as well as the USSR Ministry Instrument Making, Automation Equipment, and Control Systems, where the amounts of license trade increased due to the sale of high-level priority developments on the software of a number of automated control systems.

In some sectors the assimilation of the latest achievements of science and technology has been sped up and accordingly the tendency for the time of the assimilation of inventions, which have been used for the first time, to decrease has been noted. Whereas, for example, in the electrical equipment sector during 1983-1986 more than half of them took 4 years and more to be assimilated, in 1988 the time of the assimilation of about 70 percent of the inventions, which were introduced for the first time, did not exceed 3 years. This trend is in keeping with the average duration of the cycle of the scientific research and experimental design work being performed in the sector, which in 1988, according to the data of the USSR State Committee for Statistics, came to 2.7 years.

The first results of the effective realization of the intellectual and creative potential of developers and production workers (it is possible to add to those named above the Ivanovo Machine Tool Building Production Association and the All-Union Scientific Research, Planning, and Design Institute of Metallurgical Machine Building, which ensured the great competitive ability of products, and others) testify that they were able to achieve this by adopting the policy of the extensive introduction of fundamentally new equipment that is based on inventions and by shortening drastically the time of its assimilation.

The state of affairs in a number of other spheres is also improving. Introducing organizations, cooperatives, including centers of the scientific and technical creativity of youth, and temporary technical collectives are being established in the system of the All-Union Society of Inventors and Efficiency Experts.

In the structure of the State Committee for Inventions and Discoveries the Impuls Organization for the introduction of the very efficient pulse-wave technology, by means of which good results are being achieved in the removal of ice from various surfaces and of dried and

frozen materials in technological equipment, tanks, railroad cars, and so on, was organized and is being successfully developed. Moreover, since 1988 the Innovatsiya Scientific Production Organization for the introduction of promising developments and patent information research with subdivisions in various regions of the country has been operating on full cost accounting in Zaporozhye. It identifies and promotes the introduction of promising developments on the creation of waste-free technologies, the recovery of industrial waste, the mechanization and automation of production processes, and others.

Unfortunately, whereas at the named introducing organizations the use of inventions is improving, at state enterprises and organizations it remains a most acute problem. There are quite a number of examples, when the most important inventions of recent years are not finding use. One of them is connected with the development by the Moscow Machine Tool and Tool Building Institute of the RSFSR Ministry of Higher and Secondary Specialized education on the basis of five inventions of a new high-performance abrasive tool of broad technological application for the grinding of parts made of hard to machine materials, which makes it possible to increase by twofold the depth of the machining of a part without forced cooling and to increase by 2- to 2.5-fold the capacity of the machining of items. The priority of the development and the lack of analogs with the named technical parameters abroad foreordained the possibility of patenting three inventions in a number of developed capitalist countries. The organization of the production of the new abrasive tool does not require additional expenditures, the technology of its manufacture is simple and ecologically clean, and the anticipated economic impact in case of the extensive production and use of the grinding wheels will come to 2 million rubles a year. Many enterprises of various sectors of the national economy have declared their intentions to acquire such a tool. In spite of all this, the USSR Ministry of the Machine Tool and Tool Building Industry is not organizing the industrial production of the highly efficient innovation.¹

As a whole the obvious underestimation of inventions is continuing. This is confirmed by the indicators of the level of the developments, which have been completed by scientific research, design, planning and design, and technological organizations of industrial ministries. The analysis of the completed scientific research themes during 1985-1987 testifies that the share of those of them, the technical level of which is higher than the level of the best domestic and foreign developments, is decreasing sharply: in 1987 it comes to only 5 percent, having decreased as compared with 1985 by 50 percent and with 1980 by nearly one-half. The share of the themes, the technical level of which corresponds to the level of the best domestic and foreign developments, came in 1987 to only 24.2 percent, having decreased as compared with 1985 by a third. Here it is characteristic that the share of developments with inventions in the

total number of developments with regard to new equipment remains negligible and in the past 7 percent has hardly changed (in 1980 it was 34.2 percent, in 1987 it was 34.5 percent). The fact that given the invariability of this indicator the tendency for the share of developments, which are higher than and correspond to the level of the best domestic and foreign analogs, to decrease is being observed, testifies to the use in them of minor insignificant inventions which are incapable of having a substantial influence on the increase of the efficiency and competitive ability of products. Moreover, the inventions, which are being used in developments, frequently are of a very old age (up to 32 years). Often in "new" objects there are no inventions at all.

Why is there such an attitude of enterprises toward inventions—the main factor of technical progress? There are many reasons, but the main one of them consists in the fact that the new economic mechanism for the present does not create an economic interest of the collectives of enterprises, scientific research institutes, and design bureaus in the development of world-level equipment. The USSR Law on the State Enterprise (Association) also does not work in this direction. In it, in particular, it is stated that the large-scale, comprehensive, and timely use of the achievements of science and technology is the most important means of the increase of the profit (revenue) of the enterprise and the self-financing of its production and social development. However, in practice it is often possible to manufacture a low-quality product, to inflate prices, and to derive a large profit. Consequently, there is not need to seek and use inventions, to spend assets, and so on.

Now many people are hoping that a change for the better will occur following the appearance of the USSR Law on Inventive Activity. Indeed, the draft of this Law, which has been prepared for consideration by the USSR Supreme Soviet, introduces much that is new into the standard base of invention. Thus, a single protective document is being introduced—the patent with an exclusive right instead of the form of protection of new technical solutions in the form of an inventor's certificate, which is now in effect on the territory of the USSR. The term of effect of the patent as compared with the latter is being increased from 15 to 20 years. The rejection of the inventor's certificate is due to the fact that it came into conflict with the new economic mechanism, inasmuch as it does not take into account the principles of cost accounting, which are beginning to take dominant positions in the management of the national economy: it, by acquiring an "owner," is becoming a commodity that is intended for sale on the market.

The introduction of deferred expert evaluation is very important and fundamentally new for our country. This will make it possible to increase the quality of the applications being submitted for inventions and the level and significance of the claimed technical solutions. This

procedure stipulates that the information on the application is published by the State Committee for Inventions and Discoveries within 18 months from the time that it is submitted, and any person has the right to familiarize himself with it. The patent examination of applications is carried out at the request of the applicant with the payment of a duty, which is collected for their acceptance for consideration, the making of the expert evaluation, the issuing of the patent, its maintenance in force, and others.

Under the new conditions the economic mechanism of the use of inventions in the national economy is undergoing considerable changes. In particular, there are envisaged the recognition of the patent and the property rights, which ensue from it, as a commodity; the changeover to a system of contractual relations between the patent holder and the user of the innovation; the introduction of a new procedure of paying the reward to the authors of inventions which have been introduced during the term of effect of the patent with the establishment of its amount at not less than 5 percent of the profit (the corresponding portion of the revenue), which is derived annually by the enterprise from its use without the limitation of the maximum amount of the reward.

It seems that the basic provisions of this draft of the Law conform to the new economic mechanism, which rests on a cost accounting basis. At the same time the Law will begin to apply only when the new mechanism of management and the USSR Law on the State Enterprise (Association) take full effect. The exclusive right of the patent holder, the contractual bases of the use of inventions, and other planned changes will be unable to be implemented under the conditions of "semi-independence," "semi-cost accounting," and other intermediate states, in which an overwhelming portion of enterprises, scientific research institutes, and design bureaus have found themselves today.

In this connection it is necessary to evaluate the process of invention from the standpoint of the acceleration of the economic and social growth of society.

First of all the development of the formed tendency in the activity of many scientific research institutes and design bureaus to focus on petty topics, to conduct development in order to avoid risk at the traditional technical level, without the devising of inventions, or to use insignificant ones is intolerable. The data for the last 2-3 years testify that 90 percent of the inventions are aimed only at the improvement of existing technology, 1.5 percent are fundamentally new solutions, and 0.9 percent do not have analogs in the world. But how much capital is being spent irrationally on this inefficient activity?

A statewide system of the monitoring and evaluation of the level of the equipment being developed is necessary. Now not only is there no progress in this direction, but much of what is positive, which was achieved in the recent past when implementing (with the participation

of the State Committee for Inventions and Discoveries) of the system of the evaluation of the scientific and technical activity of enterprises and organizations, is being lost. Such work, in essence, has been curtailed.

A situation, when the presence of world novelty in "new equipment" is not taken into account, is forming. As a result inventions are not being reflected in the assignments of the section on science and technology of the USSR State Plan of Economic and Social Development and in various programs of the State Committee for Science and Technology. Previously there was an opportunity to judge by the share of assignments with inventions (in different years it fluctuated in the range of 20-25 percent) the degree of novelty of the assignments of the state plan, to evaluate the work of ministries according to the volume of the assignments that were completed at the level of inventions, to compare the amounts of financing, which are allocated for the implementation of themes that contain and do not contain inventions, and so on. Now this does not interest anyone.

But if one detects in new equipment and technology the presence of inventions, the need to make an analysis arises: what they are, what their age is, how they influence the achievement of the highest technical and economic indicators of developments. And then the attitude of developers, clients, and producers toward this work will become clear. But if a connection of inventions and new equipment is not traced anywhere, it is possible to interpret the result as you wish. The developer himself determines whether the result corresponds to the world level or exceeds it. Such a practice is preventing the attainment of the world level by our equipment and technology.

The results of the routine checks of objects of equipment, which are made by the State Committee for Inventions and Discoveries, and the conclusions of an extradepartmental expert commission on their technical level, patentability, and patent cleanness can serve as an illustration of this. Thus, in the majority of the 82 objects, which were checked in 1987 and were developed by organizations and enterprises of 14 ministries, the present trends of the development of equipment did not find reflection, which is responsible for its lag behind the world level. In particular, the TT-ChM caterpillar logging tractor of the Altay Tractor Plant (Rubtsovsk) is considerably inferior to foreign analogs manufactured in 1984-1986. Such solutions, which are widespread in the world, as turbosupercharging and intermediate air cooling, a hydromechanical transmission, disk brakes, devices for the automatic stressing of the track chain, and rubber-metal hinges were not used in its design. The model 171-6P-F3 NC semiautomatic checking center lathe, which is the base model of a robotic complex and a flexible production module, is inferior in its basic technical and economic indicators to the foreign analog. This lathe, which was developed at the Middle Volga Machine Tool Building Plant (Kuybyshev), in technological possibilities proved to be unsuitable for its use within flexible production modules.

A typical shortcoming, which was found by the expert commission, is the inexact choice of an analog for the comparison of the technical and economic indicators of the newly developed object and, as a consequence, the misrepresented conclusion of the developers about the technical level of the innovation, that is, a noncritical self-evaluation of their own results. Moreover, the formal conducting of patent research adversely affects the technical level, since inventions, which are capable of significantly influencing the technical and economic indicators of the object, are not identified in good time and remain at a disadvantage.

This and other shortcomings are due to the fact that the role of patent services, which are called upon at the present scientific methods and organizational level to ensure at all stages of a new development—from the stage of the forecast and up to the industrial production of the object—the conducting of patent research, which eliminates the desire "to reinvent the bicycle" and, having compared it with a favorable traditional analog, to pass it off as new equipment, is being underrated. A highly skilled patent service can erect a barrier to what is obsolete and orient the developer toward the devising of competitive new equipment and can eliminate "patent curiosities."

The solution of the problem is seen in the utmost influence of ministries and departments on subordinate enterprises and organizations, so as to eliminate the patent illiteracy of many of their managers and to increase the level of patent services and their influence on the end results, becoming the most important factor when reorienting the activity of ministries and departments toward the pursuit of a thought-out technical policy. Economic levers, which ensure the fundamental unity of the activity of patent services and scientific, design, and technological subdivisions, are needed.

In 1985 enterprises and organizations were ordered to combine the patent departments and the departments for invention and rationalization, to set up unified subdivisions of patent, license, invention, and rationalization work wherever this was expedient, and to enlist highly skilled specialists in it. But in practice one often has occasion to encounter cases of the reduction or complete dissolution of patent services, which, of course, cannot promote the increase of the technical level of developments. For example, at enterprises and organizations of the USSR Ministry of Construction, Road, and Municipal Machine Building during 1984-1986 the number of patent services was reduced from 150 to 92 (the number of independent ones was reduced from 17 to 5).

According to the data of a survey, which was conducted by the State Committee for Inventions and Discoveries and the USSR State Committee for Statistics, on 1 January 1986 about 6,000 patent services, of which only 2,500 were independent subdivisions, were operating in the sectors of the national economy. The rest performed invention, patent, and licensing work along with other types of activity.

At the same time practical experience shows that wherever independent subdivisions of invention, rationalization, patent, and licensing work have been established, wherever they are manned with highly skilled specialists, who have a patent training, wherever the managers of enterprises and organizations show an understanding of the importance of patent services and their role in the assurance of a high technical level of the equipment and technology being developed—there invention, patent, and licensing work become an integral part of scientific research activity. This is confirmed by the many years of experience of the functioning of the patent services of such scientific production associations as the All-Union Scientific Research, Planning, and Design Institute of Metallurgical Machine Building, the Central Scientific Research Institute of the Technology of Machine Building, and other enterprises and organizations. The inseparable unity of the process of scientific research and design work with the development of highly efficient technical solutions—inventions—is being ensured here. For example, at the Central Scientific Research Institute of the Technology of Machine Building 75-80 percent of the technical solutions are recognized as inventions. The system of forecasting and market research on the basis of technical patent and economic documents, which was organized at the association, made it possible during the 11th Five-Year Plan and 1986 to conclude about 30 licensing agreements on 30 objects.

The great effectiveness of the invention and patent activity of the Institute of Electric Welding imeni Ye.O. Paton of the Ukrainian SSR Academy of Sciences, which has to its credit more than 50 licensing agreements and contracts, is well known. This is connected to a certain extent with the great attention being devoted by institute director Academician B.Ye. Paton to invention, patent, and licensing work. Corresponding Member of the USSR Academy of Sciences S.N. Fedorov, who heads the Mikrokhirurgiya glaza Interbranch Scientific Technical Complex, is attaching great importance to these questions. Tens of licensing agreements on developments of the interbranch scientific technical complex have been concluded. The economic impact in the national economy from the use of the inventions, which were devised by the named organizations, annually amounts to hundreds of millions of rubles. And such examples are not isolated.

However, the majority of patent services of enterprises and organizations, as was noted above, are not having a substantial influence on the technical level of the equipment and technology being developed.

There are also objective reasons. Thus, the State Committee for Inventions and Discoveries has repeatedly raised before the USSR State Committee for Labor and Social problems the issue that the remuneration of the labor of the personnel of patent services is poorly regulated. The salary of an engineer of the patent sphere is set at the level of accountants, legal advisers, and sociologists, that is, it is set significantly lower than for

designers, process engineers, and personnel for the organization and rate setting of labor.

Such a situation does not make it possible to ensure preference in the stimulation of the labor of specialists, who are directly involved in the development and introduction in production of the latest equipment and technology, inventions, and efficiency proposals, as well as to enlist highly skilled personnel in this.

Our country abounds in creative potential. It has hundreds of thousands of innovators and an enormous detachment of scientists. Consequently, through the development of invention and the rapid and efficient use of the achievements of science and technology in the national economy it is possible to solve successfully the problem of the acceleration of scientific and technical progress and, hence, to strengthen the economy.

It is important to study and assimilate the know-how of Western Europe, the United States, and Japan. In the 1970's a dilemma faced them: either structural reform on the basis of the assimilation of the scientific and technical reserve or serious economic difficulties. Here two parallel means of such reform appeared distinctly. The first one is concentrated investments of firms' own resources in scientific research and the second one is a new period of the flourishing of "venture enterprise," when small science-intensive companies have been transformed from a previously auxiliary factor of development into an appreciable lever of the acceleration of scientific and technical progress. They now account for more than 50 percent of all the innovations being introduced in production. In the United States more than 90 percent of the means of new technology were developed by small firms or independent inventors. This process is tending to intensify. We still disdain invention in general and the individual inventor, who thus far is not becoming a leading figure. The experience of many inventors, who try unsuccessfully to "push" (often with the participation and assistance of the State Committee for Inventions and Discoveries) their original technical solutions, promising ideas, and inventions, which are important for the national economy, through the barriers of departmental interests and the traps of the bureaucratic techniques of coordination, is well known.

For the correction of such a situation the activity of the State Committee for Inventions and Discoveries attached to the State Committee for Science and Technology should be radically reformed, starting with the structure and ending with the forms and methods of work. It is expedient to shift the center of gravity to the maximum introduction in economic practice of inventions, first of all socially and economically significant ones, which are of intersectorial importance for the national economy of the country. It is possible to achieve this goal, provided the selection of such inventions from the automated data bank on Soviet and foreign inventions, which is at the disposal of the Committee and is unique in its potentials, is organized at a new level.

Moreover, the technical solutions received for evaluation (and there are approximately 150,000 of them a year) can serve as most valuable material for the purposeful selection of priority domestic developments. Here it is important to bear in mind that the selection of inventions should become a component of the evaluation, which will make it possible to carry it out from the initial stage of the origination of an invention.

However, the selection should not be made in isolation from the development of new equipment. Here new opportunities are appearing for the State Committee for Inventions and Discoveries for the combining of the process of selecting inventions and preparing proposals on their timely inclusion in the plans of economic and social development with the processes, which are being carried out by the State Committee for Science and Technology, of specifying the priority directions of scientific and technical progress, singling out major scientific and technical problems, as well as organizing the development of fundamentally new equipment, technology, and materials. The fundamental combination of the work on the formation of the section of the use of the most important inventions with the assignments of state orders on the development of science and technology will be achieved by means of such an interconnection.

Apparently, the Committee should have a special monetary fund for the financing of state orders, that is, work on the testing and preparation for industrial use of important inventions. This will increase its responsibility substantially and will promote the establishment of economic organizational contacts of the Committee with industry and the strengthening of cost accounting. The named fund can be replenished by means of the corresponding deductions from the profit after the introduction of a development in the national economy.

One of the ways of shifting the center of gravity of the work of the Committee to the use of inventions is the expansion in its system of the network of scientific production introducing organizations after the pattern of the Innovatsiya Organization. Such organizations could effectively accomplish the tasks of their regions and fulfill on a cost accounting basis the orders of the Committee on the testing of inventions which are being analyzed for state orders. Thereby the selection of important inventions and the preparation of joint proposals with the State Committee for Science and Technology for state orders will constitute a single process, in which every inventor will obtain more opportunities for the embodiment of his ideas.

Footnote

1. There are examples of the other sort, though not many. Thus, in the USSR Ministry of Agricultural and Tractor Machine Building a collective of inventors developed an internal combustion engine with forced ignition, in which the uniform distribution and the more complete combustion of the fuel-air mixture are ensured by changing the design of the cylinder head block. As a

result of the use of this invention the economic impact in the national economy due to the decrease of fuel consumption by 5-10 percent came in 1984-1988 to 738 million rubles.

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Soviet Science Lag Attributed to Inadequate Funding

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[Article by Doctor of Economic Sciences A. Nikolayev, professor of the Academy of Social Sciences attached to the CPSU Central Committee, under the rubric "On the Paths of the Development of Scientific and Technical Progress": "Why Are We Lagging Behind the United States? The Reflections of a Man Who Worked 10 Years in New York"; first two paragraphs are *EKONOMICHESKAYA GAZETA* introduction]

[Text] The middle of the 1960's. The new Soviet IL-62 airliner appeared on international air routes. We were rightfully proud of this, one of the best airplanes in the world. The Boeings of that time were noticeably inferior to it.

The end of the 1980's. Alas, we have lost priority in the development of civilian aircraft. Now our designers are striving to achieve the level of Boeings. And if this were the only example of our lag.... However much scientists argue about the means of developing the economy, everyone is unanimous on one thing: our future depends on the pace of the acceleration of scientific and technical progress. The scientific technical complex is the weakest link of the national economy. This assertion has become something of an axiom. So why do we lag all the same?

Customary cliches dies slowly and painfully. For many years we lulled ourselves with the thought that we have the most scientists and engineers of all, that we are spending the most significant portion of the national product on the development of the scientific technical complex, that we have the most representative Academy of Sciences in the world, and so on. How much effort Soviet scientists and propagandists spent on proving the priority of Soviet science and technology! When it came to the evaluation of the real results, the bravura tone decreased to a whisper.

Yes, our scientists have to their credit brilliant solutions of difficult scientific and technical problems. For example, the Buran-Energiya space system. And still, in my opinion, today we have to talk about the crisis which has enveloped the scientific technical complex.

Over a Decrement Curve

The opinion that the basic cause of stagnation in the area of scientific and technical development consists in the shortcomings of the economic mechanism, which does

not aim production at the introduction of the achievements of science and technology, is widespread. Up to the 1980's it was believed that only the poor use of inventions in production and a certain, they said, social dislocation were the Achilles' heel of our scientific and technical development. But in the inventions and achievements themselves, it seemed, there was no shortcoming.

However, in the 1980's the lag of the USSR in the area of general theoretical research, which was always a subject of national pride, began to come to light. By the unanimous acknowledgment of specialists, the group of fields of general theory, in which Soviet scientists define the highest world level, has now been extremely narrowed—to one or two. At the fall (1988) session of the USSR Academy of Sciences all the newly elected vice presidents for the natural science and technical cycle stressed the lag of academic theoretical research behind the highest world level.

It is possible to depict the diagram of the increase of scientific discoveries, which are entered in the state register, as a decrement curve. During 1970-1980 the annual increase of the number of such inventions came to 9.9 percent, from 1980 to 1985—5.4 percent, and during 1985-1986—3.3 percent. In the last 40 years Soviet scientists received one-sixteenth as many Nobel Prizes as Americans did. Meanwhile, twofold more scientists and engineers are employed in the sphere of science in our country. Of course, political discrimination with respect to our country, the national exclusiveness of Soviet science, and the secrecy of much scientific research also have an effect here. But we should answer in a self-critical manner at least for ourselves the question: Do even the achievements, which are registered in the country as scientific discoveries, have sufficient scientific weight?

Indeed, we do have brilliant inventions and really significant discoveries. However, the nature of the majority of used inventions, which then determine the overall level of the finished product, plays the decisive role. But there is nothing here to be particularly proud of. Many scientific research institutes and design bureaus are engaged, in essence, in the copying of already existing developments. From 1981 to 1985 only 15 percent of the new types of machines, equipment, apparatus, instruments, and means of automation, which were newly developed in the USSR, were "above domestic and foreign analogs. Let us note that this formula, which is used by our statistics, is very vague, while the real facts suggest that the indicated figure is far more modest.

The USSR accounts for a negligible share of the inventions that are patented in third countries. In 1982 of the 57,889 patents, which were obtained in the United States by Americans and foreigners, the USSR accounted for only 209 patents (0.3 percent), Japan accounted for 8,149 patents (14 percent), and the FRG accounted for 5,409 patents (9.3 percent). At that time it was customary to allude to the lack of interest of scientific

research institutes and design bureaus in foreign patents. (Departments all the more had no interest.) But it would be a big mistake not to note the inadequate technical level of many Soviet inventions.

The Conversion of Science Is Needed

People are now cursing much and readily the economic mechanism that is in effect in the sphere of science. Indeed, cost accounting in its present form (and, what is more, in the absence of real cost accounting at enterprises) is prompting scientists not to seek original solutions, but to strive to sell the worst development. Moreover, our scientists are so unaccustomed to the competitive struggle that they frequently sell developments abroad without having patented them. That is what happened with contact lenses (they are used in place of glasses). The development was sold to a foreign firm. The production of lenses was set up abroad, but they do not even sell them to us—it is unprofitable.

At present very many scientists and economists are of the opinion that it is possible to overcome the crisis in the scientific technical complex by confining ourselves to the improvement of the economic mechanism.

I believe that this is a dangerous delusion which can subsequently cost the country dearly.

Indeed, it is necessary to improve the economic mechanism both in science and in other sectors of the national economy.

But the present state of our scientific technical complex is also governed by other objective circumstances, first of all by the economic potential. The gross national product of our country is significantly less than that of the United States, which, of course, affects the amount of financing of scientific research.

For example, the USSR and the United States are working on a large number of similar scientific and technical problems. Here the USSR, having a lower economic level, is spending 3.7-3.9 percent of the gross national product on the financing of scientific research and experimental design work, while the United States is spending 2.8 percent. But on an absolute scale the United States is spending several fold more on the financing of scientific research and experimental design work than the USSR is, while in the area of civilian research it is spending 7.5-fold more.

The historical conditions of the existence of the Soviet Union formed in such a way that we always had to spend considerable capital on the strengthening of the defensive capability. And now 75 percent of all the allocations are being spent in our country on military research and development. This is tens of billions of rubles. Of course, the scientific research institutes, which work for the benefit of defense, are provided with better equipment and are supplied with better materials as compared with their civilian counterparts. Is it surprising that the efficiency of their work is also incomparably greater?

In the United States new technical and technological solutions, which have been found in the interests of the military-industrial complex, also begin to be used immediately in civilian sectors. In our country the return of military scientific research and experimental design work to the civilian sector is small and is decreasing progressively: in the 1980's it decreased as compared with the two preceding decades. Perestroika of the economic mechanism can increase the level of effectiveness of military research and decrease its capital intensiveness. However, if these assets are channeled as before into the accomplishment of unconstructive tasks, it will be more and more difficult for our economy to bear such a load. It seems that today conversion at enterprises is already entirely insufficient. Conversion is also urgently needed in the field of scientific research.

True and False Priorities

Of course, attempts were always made to compensate for the shortage of assets for science. As a rule, the priority directions of research, which, it was assumed, are of the greatest importance, were specified. They were also maintained at the world level. These "islets" stand out clearly against the background of other scientific activity.

The level of research in other directions is significantly lower than the world level. Suffice it to compare the scale of research in the area of space and ordinary, terrestrial medicine. But it is awkward to talk about the crumbs which are left for research in light and the food industries, agriculture, and even several sectors of heavy industry.

Given such a division of allocations it will not be possible not to deprive someone. Has not the time come to specify priorities with allowance made for their socioeconomic consequences? However, unfortunately, thus far the choice was made in favor of those who had greater drive and penetrating power. Groups of high-ranking officials with the help of scientists created powerful pressure on government organs, striving for the development of new scientific directions and the drafting of exceptionally capital-intensive plans under the guise that a great power cannot lag behind its capitalist competitors. And whereas "they" were the first to land on the moon, we should be the first to reach Mars. The question of the socioeconomic price was relegated to the distant background. The lack of glasnost and public control created a culture medium for the making of such decisions. All these are bitter facts.

We will not forget: scientific research is not an end in itself. It should be embodied in practice without fail. The leading development of general theoretical and exploratory applied research is natural. But the situation becomes pathological when this research is performed at the world level, while production lags 1-2 decades behind it. Until the 1970's the problem was alleviated by the fact that the priority areas of

the scientific technical complex were able to develop comparatively autonomously. However, now the isolated development of any works or directions of the scientific technical complex is practically impossible.

For example, good designs of televisions have been developed. But an element base and picture tubes are needed for their series production. But one cannot make them without the appropriate machine tools, materials, and instrumentation. For this, in turn, new grades of steel are needed; but fundamentally different equipment is required in order to smelt them—and so it goes in a circle.

Or there is the question that sets one's teeth on edge: Why has computerization not been carried out thus far? It is not a matter of the reluctance of individual bureaucrats, as they want at times to depict this. For computerization, in addition to the production proper of hardware (in which we continue to lag seriously), there are necessary: a well-developed system of communications, particularly telephone communications (in the level of development of telephone communications we are in one of the last places in Europe); a vast, well-adjusted, and accessible system of information (the solution of the information problem in our country is at one of the initial stages and is being worked on half-heartedly); finally, the level of income and the prices for computer hardware should be in line with each other.

The Time to Make a Choice

The same world level of scientific and technical products, for which we are striving, is formed first of all by a small group of highly developed countries. They have the strongest national scientific technical complexes, the largest share in the world production of technically complex items and in trade in them belongs to them. The members of this group work in the system of the international scientific and technical division of labor.

All other countries are inevitably faced with a choice: either to develop a scientific technical complex, which is advanced in level, but specialized and which is capable of participating in the international division of labor, or to acquire scientific and technical information and finished equipment and technology from the most developed countries.

In the overwhelming majority preference is being given to a combination of these versions, which also yields the greatest impact. We are also interested in this. However, the possibility of USSR participation in the international scientific and technical division of labor until recently remained extremely limited. On the market of finished equipment, technology, and scientific and technical information discrimination remains with respect to the Soviet Union. The international exchange of theoretical ideas, of course, is occurring, but it remains unstable and unreliable. Each of the exchange participants willingly agrees to cooperation only in those fields of general theory, in which the partner has known superiority and can serve as a source of useful information.

It is necessary to appear on the international market with worthy proposals. But we do have something to offer both in machine tool building and in individual fields of biology, in other fields of science and technology. We ought to concentrate all efforts on these directions, in order not to lose first place here to anyone. But we, while overtaxing the economy, conceived the idea to stimulate simultaneously all and everything in the scientific technical complex. Even the United States with its powerful potential cannot venture this!

It is necessary at last to specify the true priorities—the directions of scientific and technical progress, without which the country will not manage (for example, instrument making), and the areas of scientific activity, in which we can be the leaders. It is into this that the maximum forces and assets should be channeled. While

if we do have something to sell on the world market, hence, we will also be able to acquire what we desire.

For the time being...for the present we do not always know what is lying on the shelves of scientific research institutes and in archives. We are beginning to dig and are finding, surprisingly, that such discoveries as cold thermonuclear fusion, superconductivity at high temperatures, and resonance tunneling had gathered dust there for many years now. It is necessary to begin, in my opinion, with a detailed inventory by a competent state commission of what we do have. And not only to give our own scientists and inventors their due (which is also extremely important!), but also to identify the areas, in which it is possible to advance without repeating what has already been done.

Scientific Bureaucracy Disproportionately Large, Wasteful

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RESHENIYA in Russian No 19, Oct 89 pp 1, 6

[Article by Candidate of Economic Sciences I. Shulgina: "Sufficient, But Poor"; first five paragraphs are NTR: PROBLEMY I RESHENIYA introduction]

[Text] There are sufficient people and resources in our science. Its structure and the organization of research are intolerably poor and wasteful, the author of this article believes.

The crisis of our economy, the state budget deficit, and the lack of development of many spheres of activity, which is due to the remainder principle of financing, are now posing with particular urgency the problem of the choice of priorities in financial policy. That is precisely why such a pointed debate on the inadequacy, on the one hand, and the adequacy, on the other, of the resources, which are being allocated for the development of scientific research, is now taking place in the press.

The representatives of academic science are the supporters of the former point of view, and such publications are the majority. Their position is based on the comparison by them of the calculated (understated) statistical data on the amounts of financing, the number of personnel, the average wage, and other general indicators of science in the USSR with the corresponding data for the United States, Japan, and other developed capitalist countries.

There are significantly fewer publications with the opposite point of view. But their authors are personnel of the state machinery, who have power and make decisions, which in the end can influence (and are influencing) fatally the fate of Soviet science. They advance as a basic argument the point that the share of spending on science in the USSR comes to 3.7 percent of the national income, which as compared with the United States and Japan is sufficient.

The author does not belong to this category of personnel and nevertheless comes to the same conclusions. True, provided that money will be spent precisely on the development of science.

First of all the existing substantiation of the financing of such complex and multilevel systems as science only on the basis of the comparison of target quantitative indicators (the amounts of expenditures, the number of personnel, the spending on the material and technical base, and others) is not very specific. Only the very concept "science" remains comparable in this case. The economic characteristics of the supply of the sphere of science for our country are to a greater degree a function of organization, administration, and management than a gauge of the resources that ensure the increase of scientific knowledge.

For an objective comparison it is necessary to compare not only the general, but, what is particularly important, the internal elements of the organization of science, especially as in the USSR the organizational structure of science formed in a unique manner and by virtue of this has profound fundamental differences from the organization of science in the capitalist countries.

During the long years of the Stalin-Brezhnev five-year plans the bureaucratic command methods of the management of science led to the hypertrophied development in scientific organizations themselves of special nonscientific types of activity. As a result of the reflection in science of bureaucratic trends, the performance by science of the functions, which are not characteristic of it, of the introduction of scientific results in production and, in reality, the scientific service of the latter, the lack of development in the country of the service sphere, and the backward infrastructure of the economy, the organizations of the sector "science and scientific service" developed more in the direction of the support of administrative stability and a kind of "bureaucratic autarky" than in the direction of the support of the scientific strategy. All this led to the deformation of the structure of labor in science, the decrease of creative research activity, and the decline of the prestige of and respect for it. On the basis of the processes of the social division of labor an enormous army of personnel, who have nothing to do with research and scientific processes, formed at scientific research institutes. The person of science dissolved in the general mass of employees and was lost in the victory reports on the growth rate of expenditures and the amount of capital investments.

Subsequently the situation deteriorated even more, since "scientific service," which formed spontaneously within science, like any large system, strives for development and self-reproduction and absorbs a larger and larger portion of the resources that are being allocated supposedly for the development of scientific research.

The conclusion? It is simple: without the radical change of the established organizational forms of management of all the organizations of science that exist in the country (with their reorientation toward the development and support of strictly scientific types of activity) no investments in science will yield appreciable results.

It is possible to show this on the basis of the examination of several quantitative characteristics of the organization of science in our country.

From statistical sources we know that the annual amount of financing of science in the USSR comes to about 33 billion rubles. Of them scientific research at higher educational institutions accounts for 1 billion rubles, the academic system of science accounts for a little more, while the remaining, overwhelming portion of the financing is allocated to sectorial science, of which scientific research and experimental design development of the defense sectors of industry make up two-thirds. It

is also well known that scientific institutions and scientific research organizations, planning and design bureaus, associations, and so forth are the basic form of the organization of science in the country, while their main task is the fulfillment of the plan of scientific work.

The total number of people working at scientific organizations of the country (according to the 1986 statistical data) comes to 4,546,000. Among them there are 803,000 scientific personnel (according to the same data), which amounts to only 17 percent! And nevertheless for our enormous country these are precisely the staffs of scientists, engineers, and developers, who should engage professionally, regularly, and systematically in scientific work.

Without commenting on the obtained figures, it is possible to note merely that the real number of scientists and specialists, who are real creators of something new, is significantly less than the number of "statistical scientists." For Soviet science such moral costs as Lysenkoism, the struggle against genetics, cybernetics, and other "pseudosciences," and the aspiration for all-embracing ideologization had to be paid.

Let us return, however, to the initial figures and ask a question: But who are the remaining 83 percent of the personnel of the scientific sector?

First of all, the same statistical data testify to their poor skill. According to the data of the State Committee for Statistics, only 57 percent of them have a higher and secondary education, while the remainder are personnel of low skill. Moreover, the conducted analysis of the management structures of scientific organizations of various departments showed that an enormous number of personnel, who perform diverse management functions, as well as services of a technical and economic nature, are employed at each of them. As a whole vast inefficient production, which is dispersed among thousands of scientific organizations, formed spontaneously in the sector of science.

The formed situation is explained by the conditions, under which the formation of the scientific sector took place. A rapid increase of the number of scientific organizations occurred during the period of 1950-1965, when their number increased by practically fivefold (subsequently this process diminished somewhat and proceeded to the stage of concentration, consolidation, and the establishment of associations). The growth took the form of the increase of the total number of personnel, current and capital expenditures, and production areas. But given the strict supervision "from above" (a large number of decrees on science, instructions, statutes, and standards) and the lack of legal protection and economic independence, the organizational activity of all objects of science was able to be supported only by the established in each of them of a powerful administrative apparatus.

The quantitative increase of the number of such personnel occurred without particular difficulties. This was

explained by the easier conditions of the recruitment of personnel of low skill, by "instructions" on the necessity of filling vacancies at the end of the year, and, finally, by the significantly smaller regular wage than that of specialists and scientists. Its relatively low level made it possible to form a saving and in the end to offset the lower salaries with large bonuses.

The traditional management types of activity expanded. For example, deputy and assistant managers of scientific organizations: for science, (as a rule, several deputies), production, general questions, personnel, operations, international relations, construction, and so forth, multiplied like mushrooms. The status of a deputy required the appropriate surroundings. Numerous departments, subdepartments, groups, and services were established around them.

In scientific subdivisions themselves the number of "hidden" management personnel, who were disguised as "general institute personnel," who consist of lead and senior engineers and simply engineers and perform the same functions of management (coordination, control, agreement, supply, and so on), but within the framework of the support of the activity of the basic subdivisions themselves, increased rapidly.

One should also mention such "new fashioned" campaigns, which were conducted at one time, as the introduction of the scientific organization of labor, network methods of planning, and the automation of management systems, which entailed a new wave of the increase of the number of personnel in such newly established services as the scientific organization of labor, network methods of planning, and automated management systems.

How many of them, who are engaged in such parascientific activity, are there? Calculations show that in all more than 2.7 million people are now engaged in bureaucratic management work in science. But this is only the base of the bureaucratic pyramid that operates in science. The staff of the scientific and technical administrations of ministries and departments is situated higher, while the officials of central organs of management: the State Planning Committee, the State Committee for Science and Technology, the Committee for Labor and Social Problems, and other structures, which are responsible for scientific and technical progress in the country, are situated even higher.

It is also impossible not to speak about the remainder of the auxiliary personnel, who are kept at scientific organizations. The majority of them service buildings and structures, as well as the available hardware. These personnel are organized in conformity with the level of equipment of the 1930's and 1940's and act within the framework of long obsolete instructions and statutes.

There also testifies to the enormous number of such personnel the fact that on the average for the scientific sector there are more than five of them per science worker. And this is in addition to the fact that the

problem of scientific service is not being solved in the least, but is becoming more and more urgent. The enormous shortage of information support, the lack of software and computer service, the low quality of operating hardware, and, as a consequence, the great need for repair service belong here. This is also the lack of all kinds of consultation services, supply management, an employer strategy, and other types of service support.

Let us compare: in the United States there is only 0.6 service man, who works within the scientific system, per researcher. There it is considered unprofitable to keep low-skilled specialists in such an expensive and high-paid sphere as science. All scientific service is provided by a developed service sphere, the volume of which exceeds the production volume of the processing industry. At present in the United States the sectors, which perform services, account for 71 percent of the gross national production and 75 percent of the total employment.

In our country the highest values of the number of nonscientific personnel are noted at scientific organizations of the defense sectors. Their special status of secrecy and exclusiveness from society had the result that at many such scientific research institutes there are 10-15 service personnel per science worker!

The high and constantly increasing percentage of the overhead of science also testifies to the gigantic scale of "scientific service," which formed during all the preceding years. For those uninitiated in the secrets of accounting calculations it represents a certain mystery, although in reality this is precisely the outlays on the keeping of such personnel, which are attributed to the sum of the wage of scientific personnel. They exceeded long ago all acceptable norms. In many cases (and especially at large organizations of the closed type) their amount has already come to 400 percent. This means that the cost of the keeping of the nonscientific contingent at such organizations exceeds by fourfold the amount of the wage which is paid for the performance of work in accordance with the plan of scientific research. According to rough estimates, the total sum of the overhead of science now amounts to 70 percent of its annual budget, which comes to 23 billion rubles.

Above it was a matter, for the most part, of the organization of sectorial scientific research. But what is happening in academic science? The conducted analysis of activity of a nonscientific nature showed that on the average for institutes of the USSR Academy of Sciences there are 2.2 nonscientific personnel per science worker. At institutes of the natural science type this ratio is much higher than at humanities institutes. Here the relative share of administrative personnel is equally high everywhere. The large difference in the proportions in question between sectorial and academic organizations is explained by the existence at the USSR Academy of Sciences of a network of infrastructural service, which consists of works, organizations, enterprises, and institutions, which specialize in the service of science.

Whereas the number of scientific institutes at the USSR Academy of Sciences is close to 500, the number of service organizations is approaching 300. Of the total number of personnel, who work at the USSR Academy of Sciences, 30 percent are employed in its infrastructure.

Of course, the form of scientific service, which functions at such a relatively small (with respect to the amount of consumed resources) scientific center as the USSR Academy of Sciences, is far from the ideal model, which it would be possible to introduce in sectorial science. The academic system of the organization of science, including its service sphere, has its own peculiarities and drawbacks, to which numerous publications eloquently testify.

Everything presented makes it possible to draw at least two conclusions: in the internal structure of scientific institutions, organizations, design and planning bureaus, scientific associations, interbranch scientific technical complexes, and so forth, there are enormous reserves, the answer to the question: Where is one to get the money for the development of science? is found precisely there—all scientific institutions and scientific organizations should be concerned with science, while the assets, which are allocated to them, should ensure its development and achievements; any other means leads to the complete fruitlessness of science and the waste of vast resources.

VASKhNIL Official Interviewed On Changes, Accomplishments

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[Interview by correspondent A.I. Astreyko with Ivan Nikolayevich Nikitchenko, deputy chairman of BSSR Gosagroprom, doctor of agricultural sciences, BSSR Academy of Sciences corresponding member, and chairman of the VASKhNIL Western Regional Department Presidium: "How to Raise the Effectiveness of Scientific Development"]

[Text] **Astreyko:** Ivan Nikolayevich! Academician A.N. Nesmeyanov once compared the development of science to a street fight for the possession of a building: first, breaking onto a new floor, then spreading out along the floor. What do you think, what floor of break-through is Belorussian agricultural science on now?

Nikitchenko: If we assess the work of Belorussian agricultural science from the position of Academician A.N. Nesmeyanov's model comparison, its position could be defined as multifaceted and complex. In a number of problems, the break-through onto new floors in the buildings is obvious, others are spreading out on a floor, and the rest are trying to take the next necessary floor.

Here are several examples to confirm this. Associates at the Belorussian Scientific Research Institute for Potato, Fruit and Vegetable Cultivation, jointly with colleagues

from other scientific research institutions, have developed a fundamentally new technology for potato seed-growing on an improved basis, using the modern achievements of biotechnology. This really is a "break-through" in the sector. This technology helps to cultivate potatoes ecologically safely, guarantees a crop yield at a level of 250 centners of tubers per hectare with high quality. No less than 250 million rubles of profit annually can be obtained using this method.

Such developments exist in virtually all scientific production associations and scientific research institutions. Thus, at the Farming Scientific Research Institute there is a broad range of new high-yield varieties with a developed technology for cultivating them. At the Scientific Research Institute for Protection of Plants there is a biological protection system for closed-soil vegetables. The Soil Sciences and Agrochemical Scientific Research Institute has methods for improving the agrochemical and physical-chemical indicators for reclaimed soils. Using them reduces the outlays for fertilizers per unit of production from 38 to 34 kilograms and reduces expenditures of energy resources by 8-10 percent.

At the SRI for Potato, Fruit and Vegetable Cultivation, besides the above, new varieties have been created which are highly resistant to phytophthora, the potato nematode and other diseases. Their crop yield is up to 700 centners of tubers per hectare.

The Animal Husbandry SRI has created highly productive breeds of animals and has developed technologies and technical tasks for farm projects in which animals can provide 6-7,000 kilograms of milk annually with minimal outlays of fodder and human labor. The Experimental Veterinary SRI has a number of methods and highly effective vaccines for preventing cattle diseases. Associates at the TsNII For the Mechanism and Electrification of Agriculture have created the AKSh-7.2 Combine for the pre-sowing soil processing, machines for introducing mineral fertilizers and chemical compounds with a disproportion of 15 percent, which has no analogs or surpasses foreign models. There are also valuable developments among designers working on equipment for meat and milk industry enterprises, among the creators of automated control systems, and among scientists at the Institute of Economic Problems.

Astreyko: How is the spread of science on the floors of the building going?

Nikitchenko: Unfortunately, it lags somewhat behind the scientific development work. The main reason is that, in practice, very few people are interested in this process now. Whereas the need has appeared for scientists, in connection with the conversion of science to cost-accounting, to implement their developments in practice, for the time being the rest of the links have no such interest, since there is no economic mechanism for stimulating scientific and technical progress. Meanwhile,

the existing prices for agricultural production and subsidies encourage dependence. The administrative apparatus has little interest in using the achievements of scientific and technical progress, since payment for the work of administrators depends on one's position, not on the final results of the sector. There is only way out of the situation: creating the necessary economic levers for NTP and removing all the intermediate links between scientific institutions, scientific production associations and the direct consumers of scientific production—the kolkhozs, sovkhozes and processing enterprises.

Astreyko: In what and why do we lag behind the world's leading scientists?

Nikitchenko: I disagree with this formulation of the question. Most of our scientists, in terms of their level of knowledge and the significance of their fundamental and applied research, are not inferior to foreign scientists, but hold leading positions in the world in many areas. Thus, for example, even during the lifetime of T.N. Kulakovskaya, a VASKhNIL academician and BSSR Academy of Sciences corresponding member, her fundamental and applied research on the interrelations between the biological requirements of plants and external conditions for their growth and development received high ratings and world recognition not only at numerous international symposia, but also as a result of their implementation. They have enriched agrochemical science on the whole. The well-known theoretical and applied achievements of the Belorussian agricultural scientists I.D. Mukhin, P.I. Alsmik, and others in the selection of grain and bean cultures and of potatoes, are extensively used to grow new varieties in CEMA member countries and in several capitalist countries.

Currently, the ties between our agricultural science and scientific institutions in the GDR, Poland, Czechoslovakia, Cuba, Sweden, and other countries, have begun to expand noticeably, especially in biotechnology, the selection of plants and animals, prevention of diseases and creation of new veterinary preparations, and in the development of mechanized equipment. Such international cooperation mutually enriches scientists and contributes to accelerating scientific and technical progress.

If we speak of development and lag in individual scientific fields, we must acknowledge the existing gap in biotechnology and virology, and in the electronification and computerization of technical facilities and of the agroindustrial industry on the whole (by about 5-10 years). The situation that has taken shape is a consequence of ignoring the priority nature of these directions in their day. We also lag in the practical implementation of scientific developments that have already been made. The basic reason is the relatively low level of the experimental base, the command-administrative methods for assimilating developments, and complete disinterest in this on the part of the APK management apparatus at all levels.

Astreyko: Ivan Nikolayevich, in your opinion, what must be done to overcome the lag?

Nikitchenko: We must seriously work on the problems of organizing agricultural science, starting from research on up to assimilating its achievements. We must increase state allocations for high-priority areas, genuinely work to reinforce the scientific and experimental base of scientific research institutions, and carry out more goal-oriented work to train scientific cadres. In the area of assimilating scientific developments, we must give complete independence to their direct consumers, the enterprises, kolkhozes and sovkhozes, and must create a system based solely on economic methods. The most acceptable way to strengthen the integration of science and industry at this stage, in my opinion, is the scientific production (production) systems and the voluntary associations, created on their basis, of producers of different types of agricultural output, which will permit the elimination of any diktat from above and create conditions for true creativity.

Astreyko: Ivan Nikolayevich! Do Belorussian scientists have their own school of thought? How come they existed before, but are disappearing now? Or am I mistaken?

Nikitchenko: Belorussian scientists had and still have schools. Regardless of all the negative phenomena, which has occurred in science and were, as a rule, the consequence of mistakes by the leadership at all ranks, continuity in science nonetheless was preserved. At the BSSR SRI for Farming, the school of professor I.D. Mukhin, Hero of Socialist Labor, has received the latest development in the persons of scientists such as V.A. Lavrukovich, I.Ya. Shcheglov, E.P. Urban and others, and new ones have appeared as well. Through the persistent labor of scientists from these schools, 11 new varieties of grains, beans, and fodder crops were grown and submitted for state varietal testing in 1988. These include the Kalinka variety of winter diploid rye, the Vizit and Veres varieties of barley, the Gelena and Selena, Nalibokskiy and narrow-leaf fodder lupine, Zhaleyka-2 buckwheat, Otradnenskiy winter rape, Plissa mixed orchard grass, and others. At the Belorussian SRI for Potato, Fruit and Vegetable Cultivation, the school of P.I. Alsmik, VASKhNIL and BSSR Academy of Sciences academician, Hero of Socialist Labor, under whose guidance 16 candidates of sciences and one doctor of sciences were trained, is functioning successfully. They have grown and regionally adapted 28 varieties of potato (Belorussian Early, Ogonek, Loshitskiy, Temp, Otrada, Dobro, Lasunok, and others), distinguished by high taste qualities. Varieties from Belorussian selection fill more than 92 percent of the plantings in the republic and more than 31 percent in the country on the whole. Recently, they have even become popular abroad. The scientist and his students I.I. Kolyadko, I.A. Semenova, A.Ye. Zuykov and others are doing a great deal to make the potato rightfully the national treasure of the republic. Academician S.G. Skoroparov, the greatest Belorussian

scientist in the field of farming, soil sciences and agricultural land reclamation, has created an excellent school.

A whole galaxy of talented scientists and engineers have been trained under the guidance of S.I. Nazarov, VASKhNIL academician, honored leader of science and engineering in the BSSR, of M.M. Severnev, VASKhNIL academician, and of I.S. Nagorskiy, VASKhNIL corresponding member—more than 68 candidates of sciences and over 10 doctors of science. Thanks to their creative efforts, in the current 5-year period alone more than 50 types of urgently needed machines and equipment for the country's kolkhozes and sovkhozes were developed in a short time period, many of which surpass the world standard (the RShU-12 rod mineral fertilizer spreader, the AKSh-7.2 wide-rake combine for pre-sowing soil processing, the KORK-15a equipment complex for preparing full-ration fodder mixtures, the ED-1 electrical exterminator, and a number of others). The country's plants are producing more than 40 types of machines and equipment for the mechanization of agriculture, in the development of which scientists from these schools participated.

Professor N.A. Kovalev, doctor of veterinary sciences, has created a school of veterinary virology in the republic. He has trained 15 candidates of sciences and a doctor of sciences. A number of this school's developments meet the world standard (methods for diagnosing neuroviral diseases, vaccines against infectious rhinotracheitis and parainfluenza, and against animal rabies). Schools of an agricultural nature and in other fields—protection of plants, selection of animals, genetic engineering, etc.—are functioning and being developed.

Astreyko: You headed the VASKhNIL Western Regional Department. What were its tasks?

Nikitchenko: The VASKhNIL Western Regional Department was created on 7 September 1971 and is a scientific methodological center for developing agricultural science in Belorussia, Lithuania, Latvia, and Estonia. The department's basic tasks include the practical implementation of scientific support for kolkhozes, sovkhozes, processing and service enterprises and organizations, the close integration of science and industry, the more extensive application of scientific achievements in practice, and strengthening results and the growth of economic effectiveness of the agroindustrial complex's industrial and scientific potential.

The associates of all agricultural scientific research institutes and nine recently created scientific production associations are doing scientific work in agriculture within our republic. In addition to this, such work is being done at six comprehensive oblast experimental agricultural stations and four sectorial VUZs, as well as in agricultural VUZs. The VASKhNIL Western Regional Department coordinates all this work.

We have begun restructuring agricultural science with the radical reorientation of the management of scientific

institutions. Whereas institutes previously existed as the object of management for the employees of the BSSR Minselkhoz Main Administration for Science, now the employees of the BSSR Gosagroprom Main Administration for Scientific Support have become the attending link for scientific institutions.

Then there was the great breaking of the planning system in science. For 3 years, we converted from random uncoordinated planning to a comprehensive, purposeful method. Instead of the 137 assignments of various programs, 16 comprehensive sectorial republic programs have now been created whose final goal is to develop fundamentally new intensive, ecologically safe technologies for the production and processing of agricultural output.

The finance system has been restructured according to the comprehensive, purposeful method of planning. Today, all institutes and experimental stations have converted to cost-accounting and complete self-financing. Programs are financed, not scientific institutions. The payment of salaries for scientific associates is being reconsidered for purposes of relating it to final results.

Great shifts are occurring in the integration of science and industry. Right now, a fairly effective form for communication among scientific institutions and kolkhozes and sovkhozes has been found. These are the so-called systems, in which the developers of new things and farms interested in using innovations in production are united on the basis of voluntary principles. The systems exist on the additional profit obtained from the joint work of the partners. Thus, science is actively being included in the production process and economic levers encourage this activeness. More than 50 systems, including more than 1,100 farms and enterprises, have been registered in the republic.

Astreyko: Can opposition to restructuring be felt, and from what side?

Nikitchenko: Particularly recently, I sense a stubborn, even, one might say, embittered opposition to the restructuring of scientific support on the part of the administrative apparatus on the republic and oblast floors. For example: recent party resolutions and common sense aim to reorient science from serving the administrative apparatus, for which scientific and technical progress is alien by its very nature, toward work with direct consumers—kolkhozes, sovkhozes and processing enterprises. In this case, scientific research institutions should be free from the supervision of the bureaucratic apparatus. Nonetheless, however, Gosagroprom plans are still under way for transferring the scientific research institutes from the VASKhNIL Western Department over to apparatus subordination, under the direct leadership of sectorial main administrations. Yet, are these main administrations needed? Is this step right? No one needs to think long for the answers to these questions.

Ever greater pressure is being put on the systems. Everything is being done to discredit them. They are not receiving the funds, special equipment, and fodder additives allocated to them and naturally cannot work as expected. However, to make up for this in exchange for these democratic forms, the BSSR Gosagroprom and the oblast agroprom propose creating more than 25 associations with an administrative apparatus of over 1,200 people. That is democratization for you. Many such examples could be given.

Astreyko: What is the future of Belorussian agricultural science?

Nikitchenko: The future of Belorussian agricultural science depends on the developmental paths that it takes. If science is developed comprehensively, scientific institutions will be in the center: science will strengthen and hold its well-deserved place in the republic economy. If the administrative approach wins and scientific institutions once again become subordinate to the bureaucratic apparatus, science will have no future. I think that the first path will prevail.

Scientists Call for National Information Policy

907A0001A Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 28 Sep 89 p 2

[Article by A. Loktev, V. V. Mironov, V. N. Mironov, and D. Sheremetyev, associates of the Gorkiy Affiliate of the Central Scientific Research Institute of Shipbuilding Technology, under the rubric "Point of View" (Gorkiy): "How Much Is a Pound of Information?"; first paragraph is SOTSIALISTICHESKAYA INDUSTRIYA introduction]

[Text] Our state scientific and technical information system (GSNTI) does not have equals in the world either in gigantic scale or in the insignificance of the result. The mountain, which brought forth the mouse, is up to 10 all-union scientific information institutes, such as the All-Union Institute of Scientific and Technical Information, the All-Union Institute of Interbranch Information, and the Central Scientific Research Institute of Patent Information, 15 republic, several tens of sectorial, and hundreds of regional institutes, centers, and head and base departments of scientific and technical information. But there are also the social sciences, health care, and education, and there they have their own networks, their own information support systems!

And against the background of this abundance there are the complaints of users: designers, process engineers, scientists, and administrators, which are increasing in geometric progression, about the impossibility of obtaining ordinary, most simple information.

A imposing term has been invented for the explanation of this paradox: "information crisis." They say that the amounts of information are increasing more rapidly than they are able to process it—that is the cause of the jams. But such an explanation does not satisfy the sober-minded specialist—the user and at the same time the generator of information. He knows that new information originates only under the influence of previous information. Interruptions and the delay of the receipt of information without fail also cause a delay in its reproduction, so that the process proves to a certain degree to be self-regulating.

In reality our "information crisis" is a crisis of common sense, which from approximately the middle of the 1970's as applied to information services was as if outlawed. In order to establish this, it is sufficient to address elementary questions to the state scientific and technical information system: Specifically whom does it supply, why, how, with what, and at what price? And it will turn out that the system is oriented toward a certain abstract subscriber "in general," whom it supposedly is called upon to supply with every and all types of scientific and technical information with the maximum thoroughness and accuracy. But this is a utopia, a harmful and expensive one. The state scientific and technical information system is a service, support system of scientific and technical progress, which is similar to the circulatory system of the body. Without continuous

adjustment to the present needs of the client, without the division of information into mandatory, recommended, and notifying information and so forth and into information for one-time use and long-term storage, and without effective decentralization, specialization, and cooperation the normal operation of all the subdivisions of the state scientific and technical information system as a whole is impossible given any increase of the pool of computers, staffs, and capital investments.

The unsatisfactory, to put it mildly, state of the state scientific and technical information system is connected with the fact that (if we develop the image of the circulatory system) for long years all attention and all efforts were aimed at the functioning of the vessels. And here we achieved, it must be admitted, significant gains. We have elegant theories, a body of mathematics, and data transmission hardware. In short, we are equipped, perhaps, not as splendidly as they are across the ocean, but it is possible to work. However, no one devoted proper attention to the "blood" that should circulate through these vessels, that is, to information proper. For the formulation of basic principles and concepts of the handling of this substance the science called information science emerged at one time in our country and abroad. But whereas in the West it simply remained a science, which studies information itself, the methods and rules of its transmission, the laws of its perception, and the like, to a significant degree we lost this school. A fatal mistake took root even in the language, where by "informatika" they began to understand the saturation of society with information technologies and even more narrowly: with computer hardware.

Moreover, cost accounting is aggravating the already tragic situation. The negative attitude of the technical control services of enterprises toward the helpless scientific and technical information services previously was moderated only by the awareness that these expenses are from "uncle's" pocket. Given today's universal lack of interest of enterprises in the introduction of new equipment and technology, sectorial scientific research institutes and design bureaus are finding with difficulty the assets for the preservation of even the basic subdivisions and are "cutting" first of all the scientific and technical information services. The last, even ephemeral control over the development of the sector is thereby being lost.

Thus, since the bankruptcy of the existing scientific and technical information system is becoming a fait accompli, but society urgently needs some system and information itself, the question inevitably arises: How is the situation to be remedied?

Let us say at once: this task is exceptionally difficult. Precisely for this reason the first thing that we propose is to develop a precise and clear concept of the information support of scientific and technical progress in the country. However, here one should, perhaps, abandon the process of developing numerous concepts, which was hallowed for decades. If a regular state department, which is financed from the budget and is not responsible

for the consequences, evaluates a design, it will be, in our opinion, useless. What if one were to discuss the establishment of a certain pool or a unified fund (the name does not matter) of industrial enterprises and institutes that use information, which with the money of the shareholders would announce and hold an all-union competition for the development of such a concept? Then not bureaucrats, but people vitally interested in success would discuss and evaluate the proposed versions. Only the evaluation and approval of specialists, who are the users, should become for a program a permit for implementation.

But until all this happens, the state scientific and technical information system should be modified by some individual improvements. Thus, the most urgent steps are required for the encouragement of the publication and exchange of notifying information on a product that is being developed and series produced, on materials, components, tools, and the like. Of course, only competition and the commercial interest of producers will become the main stimulus for the development of this activity. But the state should already know to undertake the creation of favorable, stimulating conditions for enterprises that are engaging in this activity: be it in the form of tax breaks, interest-free credits, or some other privileges, perhaps, in centralized supply, while it still remains. New money is not required for this: it is necessary merely to redistribute here a portion of the assets that are being thrown away on the publication of trivial bulletins, with respect to which what is called the "wastepaper factor" (that is, the ratio of the number of pages, which remained unread, to the total size) comes to 0.85-0.9.

Of course, it is necessary to change the system of the remuneration of the labor of personnel of information services. The appeals "to put all of them on cost accounting" do not seem reasonable. First, it is absolutely incomprehensible for what they are to be paid under cost accounting and for what a fee is to be collected from their clients. For "the number of sheets" in publications? The length of the films of microfilms? The amount of used information? Second, there are "poor" sectors of the national economy, which all the same need information, but for the present they do not have the money to pay for it. With what will schools pay? Polyclinics? Academic institutes of history, language, philosophy? Apparently, it is necessary here to study well the experience of western countries, and first of all the United States, where there are pay (and very expensive!) information support systems and absolutely free systems, which are financed by the government or charitable foundations.

It is possible to name many other points, on which it is necessary to perform work in order to establish in the future a normal scientific and technical information system in the country. If one sensibly disposes of even the available assets and places the future state scientific and technical information system right side up, additional allocations will not be required. Head sectorial institutes now skim the "cream"—up to 70 percent of

the allocations. The base and head scientific and technical information departments gather up the remaining 30 percent. This is absurd. All the assets for the patent information support of scientific and technical programs should spread from the hands of the client among the immediate performers at all the stages: exploratory research, scientific research and experimental design work, production.

New Independent Institute for Automation, Informatics Established

907A0021A Moscow NTR: PROBLEMY I
RESHENIYA in Russian No 18, Sep 89 p 3

[Interview with Doctor of Philosophical Sciences Professor Anatoliy Ilich Rakitov, general director of the Institute of the Informatization of Society and the Development of Science, by NTR: PROBLEMY I RESHENIYA observer F. Vladov, under the rubric "Panorama": "An Institute Without a Staff"; date and place not given; first two paragraphs are NTR: PROBLEMY I RESHENIYA introduction]

[Text] Nearly a year ago we told on the pages of NTR about an idea that originated among the participants in the 1st All-Union Symposium on the Informatization of Society and Information Technology—the establishment of an independent institute for these problems (NTR, No 22, 1988). Apparently, the times are actually changing: only 10 months passed from the idea to implementation. On 4 August the decree on the organization of one of the first independent scientific institutions in the Soviet Union—the Institute of the Informatization of Society and the Development of Science—was signed.

Our observer F. Vladov talks with Doctor of Philosophical Sciences Professor A.I. Rakitov, general director of the new institute.

Vladov: Anatoliy Ilich, I read with interest the charter of INFORAN [the Institute of the Informatization of Society and the Development of Science]. In my opinion, it differs greatly from customary documents of this sort, since it allows all the individual and collective members of the institute in practice to freely choose the theme of research, clients, personnel, the forms of work, and so forth, without submitting all this for approval to anyone, except your scientific council.

Rakitov: Indeed, for our country this seems unusual. But in general in the world what are called "independent" scientific organizations are quite widespread. As a rule, scientists themselves establish them, they pose problems, solve them, and implement them in practice. All this is done on a commercial basis, is self-financed, and ensures both the freedom of scientific inquiry and the independence of points of view.

Of course, similar organizations were impossible during the recent period of stagnation, but now, when we addressed such a plan to the State Committee for Science

and Technology, we encountered full support. Nevertheless, although everyone wanted to help us, for a long time we did not succeed in finding the official form, in accordance with which it was possible to organize our institute. As it turned out, in the country such a precedent simply did not exist! As a result with the assistance of lawyers we reworked our charter nearly 20 times and still came to an impasse: everyone—the State Committee for Science and Technology, the Council of Scientific and Engineering Societies, and other organizations—were “for,” but the matter did not make progress.

I. Bortnik, first deputy chairman of the State Committee for Science and Technology, helped. He sent the appropriate petition to the Center of Scientific Research Activity, Research, and Social Initiatives (TsENDISI), which had been established by the USSR Council of Ministers under the USSR Academy of Sciences and one of the prescribed functions of which was precisely the institution of new scientific forms on the initiative of scientists. There they studied our proposals carefully, but quickly and in a few days legalized the unusual organization: they approved the charter, helped to open a bank account and to obtain a seal, and so forth.

Vladov: Did I correctly understand that at the institute there will not be permanent associates?

Rakitov: I would say that we will not have a permanent staff and especially a manning table. Only temporary collectives, which are established for specific problems and only for the time of the solution of these problems, will operate. Here the basic principle is the maximum mobility of scientific groups and individual studies. In the United States up to 30 percent of the scientists annually change their place of work or research theme. We are attempting to develop a similar model, and if the attempt is successful, we will begin to duplicate it throughout the Union.

True, we will have a small administrative staff. But whereas the administration traditionally strives to supervise scientists, we regard the service of researchers as its main task.

Vladov: How will the work of the institute actually proceed?

Rakitov: Any ideas, which have been received “from inside” or “from outside,” proposals, or orders will first be discussed in the scientific council of the institute. Those, which have gone through its screen, will appear at

the permanent seminar, to which all interested people—both potential performers and potential clients—will be invited. The specialists, who have “found each other,” then are organized into a temporary collective, establish contact with the client, receive financing and a material base, and set to work. When it is completed, the group either finds a new theme or breaks up.

Vladov: But what if there are too many proposals, and you “cannot swallow” them?

Rakitov: According to the charter we have the right to establish organizations, which are similar to ours, and can as if be divided. Such a trend, incidentally, is now very popular in the West. For example, the giant firm IBM recently split into 16 corporations, AT&T split into 22, and so on. All our organizations will be made equal in rights, they can and should compete with each other. For the most terrible enemy of science, perhaps, is monopolism, which was rejected long ago in developed countries, and the thesis that competition gives rise to secrecy has already lost touch with life. Information today becomes old so quickly that it costs one more to hide it, it is far more advantageous to sell or exchange it in good time for just as useful information. In short, if there were supply, we would provide demand.

Vladov: At one time it was a question of the Institute of the Informatization of Society. From where did the addition “and the development of science” in the name—and, apparently, in the themes—come?

Rakitov: This was proposed in the State Committee for Science and Technology, but we came across it “by luck.” Now it even seems strange to me that from the very start I did not take into account the interconnection of these directions. For I had repeatedly promoted the idea that the informatization of society does not reduce at all to its computerization. The latter is merely a tool for building an information society, in which the basic object of production is information. We know, after all, that Thailand or, for example, South Korea, which are saturated with computer hardware, are not information societies. They use not their own, but imported scientific information—from the United States, Japan, the FRG.... We, if we want to hold a worthy place on the world arena, should have our own powerful information base and our own significant information resource. So that the informatization of society is directly connected with the development of science, and we merely reflected this fact in the name of our institute.

Inventors React to Quashing of Draft Patent Law**Supreme Soviet Committee Attacked**

907A0019A Moscow NTR: PROBLEMY I
RESHENIYA in Russian No 17, Sep 89 p 4

[Article by Candidate of Chemical Sciences F. Kontorovich under the rubric "A Reader Poses a Question" (Leningrad): "Is the 'Philosophical' Committee for Science Needed?"]

[Text] The interesting and topical article of N. Linnik, "A Sudden Halt," was published in NTR (No 14, 1989). However, in my opinion, the author did not reveal to the necessary depth the reasons, for which the passage of the Law on Inventive Activity was stopped. The sources of what happened very likely lie not in separate individuals, who contributed to the shifting of this draft law to the periphery of priority legislative steps. The essence, I am convinced, lies in the fixed stereotype of thinking, due to which a disdainful attitude toward intellectual scientific and technical activity appears, at times even unawares.

However, in my opinion, the clause of the article of N. Linnik, which talks about the necessity of "the legal support of scientific and technical progress in social production," is very productive. It is clear to me, for example, that it is a question of the necessity of the legal protection of the intellectual activity of a person in the sphere of science and technology.

I can also completely agree that the legal support of scientific and technical progress should be of an integral, comprehensive nature. Although the concept of the integrity of scientific and technical progress for various people can be different.

The integrity of the legal support of scientific and technical progress seems to me personally like a set of legislative acts which ensure the best accomplishment of the cycles of the innovation process—from basic research (or from the idea) through applied scientific research and experimental design work, pilot experimental works, and the industrial duplication of the results of development up to the use of these results.

A different interpretation is also possible. It is entirely possible also to include in the concept of the integrity of the legal support of scientific and technical progress other components, namely education, culture, training, ethics, and morals.

However, one should not, I am convinced, do this. Let such a complex system of dialectically linked categories remain a subject of philosophical quests. For the sphere of legislation narrower spheres of activity should be the object of regulation. For example, the specific or initial cycles of the innovation process. In other words, the core of social reproduction.

But now let us return to the stereotypes.

Let us recall how the committee, of which it is a question, was established in the USSR Supreme Soviet. I believe that precisely the disdainful attitude toward science and the failure to understand that many losses in society are due to this disdain, had the result that in our highest legislative body there was established, I would say, precisely a "philosophical" committee.

Here the remainder principle also still appeared to the full extent. Initially as if the most important committees were established, then a committee, into which everything remaining got, was formed.

The Committee for Science, in addition for public education, and, what is more, for culture and training originated that way. A structure, which creates the illusion of the complete coverage of the sphere of scientific and technical progress, was formed. An entirely logical structure from a philosophical point of view.

In reality, so it seems to me, the state of our science still does not seem threatening to many deputies. Owing to which it, apparently, in their eyes also did not "long" for a separate committee. True, several deputies attempted to insist on the necessity of establishing a separate committee that was clearly specialized in science. They were even promised that this would be examined in the future. Later on....

But meanwhile we were faced with what N. Linnik wrote about in NTR. Figures of culture, education, and training have already begun to examine the most urgent problems of science and technology and to make decisions on them. And some people from the scientific and engineering corps of deputies did so only together with them.

There is no doubt about the urgent need to raise culture, education, and training to a higher level in our country. One must not on any account discriminate against this area of legislation. Precisely it should form a higher spiritual, intellectual, and scientifically productive level of our society.

Is it perhaps advisable for this reason as well to divide the mentioned committee, having formed the Committee of Science and Scientific and Technical Development and separately the Committee of Public Education, Training, and Culture?

Urgent Need for Action

907A0019B Moscow NTR: PROBLEMY I
RESHENIYA in Russian No 18, Sep 89 p 5

[Letter to the editor by I. Krylov under the rubric "Letters Dispute": "A Harmful Situation"]

[Text] In the articles of N. Linnik (NTR, No 14, 1989) and F. Kontorovich (NTR, No 17, 1989) just anxiety about the fate of scientific and technical progress is expressed in connection with the fact that the approval by the USSR Supreme Soviet of the Law on Inventive Activity was shelved.

Sharing their apprehensions, I believe that the forming real situation is far more dramatic than it is possible to understand from these articles.

Let us imagine what this postponement threatens. In 1989, 15,000 fewer applications for inventions have already been submitted than during the preceding year. It is not necessary to be a prophet in order to confidently predict a far sharper decline of inventive activity this year. But what awaits the large army of staff and nonstaff experts of the All-Union Scientific Research Institute of State Patent Examination in 1990? Unemployment?

The inventor, of course, is correct in withholding applications until the introduction of the new legislation. In the draft of the law he is promised the right to a patent and license and a fivefold increase of the amount of the author's award. He, in the final analysis, can wait a year. It is customary for our inventor to wait and endure. But can the priority of domestic science and technology "wait"?

Today, when in 1-1.5 years a generation of equipment is replaced in many sectors, are there guarantees that technical solutions, which have been put away in a distant desk drawer, will not be found in this time by colleagues abroad?

The long-term postponement of the placement of a law into effect and the question of the survival of the patent services of the country are no less urgent. We have far fewer of them than in the developed industrial countries—after all, only 4 percent of the population employed in the national economy is engaged in technical creativity. And of these approximately 6,000 patent subdivisions during the first half of this year not more than half survived. With the changeover of enterprises and organizations to cost accounting the reduction of patent experts assumed a mass nature, especially in the sectors of the machine building complex, which are crucial for scientific and technical progress. I will not cite numerous examples: the delegates of the 7th Congress of the All-Union Society of Inventors and Efficiency Experts spoke about them, the journal VOPROSY IZOBRETELSTVA is constantly writing about them.

Try to explain to the director the need to preserve the size and structural independence of the patent department, when the potential profit of the enterprise from domestic license trade is receding like a mirage in the desert, while the highest legislative body of the country is openly displaying complete contempt for the labor of inventors and patent experts. Where is one to find arguments?

I recently heard of the attempts of a group of Moscow inventors to submit to the Supreme Soviet for approval, "until a new law arrives there," a slightly patched and touched up version of the 1973 Statute that is now in effect. It is difficult to invent a more harmful and absurd step! All the developed countries of the world regulate inventors' legal relations at the level of laws, while the latest version of the draft being discussed for all the shortcomings and omissions is still an order better than the Statute which has become obsolete after 16 years.

There is carved on the facade of the American patent office a phrase that belongs to Abraham Lincoln: "The patent system pours the oil of interest on the fire of genius." Yes, the U.S. president himself was an inventor, and it is not surprising that he was well aware of the role of good patent legislation 1.5 centuries before the era of the scientific and technical revolution.

It is well known what enormous attention western firms and government organizations are devoting to patent and license policy. Suffice it to say that questions of the improvement of patent level on several occasions were themes of a television address to the nation of Ronald Reagan, who in his "civilian specialty," as is known, is significantly farther from jurisprudence than Mikhail Sergeyevich Gorbachev.

As in much else, in the cultivation of the patent culture of engineers and scientists, which is not less important than computer or management culture, we are constantly in the position of pursuers. Now it seems that the patent potential of the country, which has been accumulated with enormous difficulty for decades, was lost without being noticed over some year.

Perestroika Eases Inventors' Frustrations With Bureaucracy*907A0026A Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 19 Oct 89 p 1*

[Article by inventor B. Danilov, lathe operator and pattern maker: "Inventors and Perestroika"; first paragraph is SOTSIALISTICHESKAYA INDUSTRIYA introduction]

[Text] While meeting with friends and associates in innovator affairs, 2-3 years ago we usually shared our bitter experience. For the logical conclusion of every invention is its mass introduction for the benefit of people. But precisely this did not happen. No, even now, in the 5th year of perestroika, our inventions have not begun to be introduced rapidly, but still a sense of the necessity of our work has appeared.

A. Semenov (in the past a mechanic of the Moscow Salyut Plant) for 15 years sought in the Ministry of Instrument Making, Automation Equipment, and Control Systems the mass production of his invention and, of course, in vain. But this year the Poisk Cooperative began preparation for the series production of this innovation. The invention of Semenov is a new pencil, of which the country needs several billion annually. Cedar forests are being cut in Siberia for their production. The pencil of Semenov will make it possible to preserve their remnants and at the same time will be better and less expensive. The Kishinev Pencil Factory is now putting on sale its own pencil, which no one is buying due to its uselessness and absurd price (1 ruble 55 kopecks). The cost of the pencil of A. Semenov is 20 kopecks, its quality is excellent.

V. Tepikin, an honored efficiency expert of the republic, developed and produced a full-scale model of a cart for food products and other loads. This cart rolls just as easily over the road and over...stairs (up and down), even to the fifth floor. This year the cart of Tepikin was displayed at the Exhibition of National Economic Achievements and received a silver medal of the exhibition.

V. Trutnev, a lathe operator and instructor of the Leningrad Bolshevik Association, for his inventions was awarded the USSR State Prize. For years and decades the Ministry of the Machine Tool and Tool Building Industry has not wanted to produce his device "A Lathe Attachment," the new "Hydraulic Tracing Slide," and many other inventions. I visited the Bolshevik Association and saw how the devices of V. Trutnev work. The output of any lathe, which is equipped with one of them, increases by twofold, here no additional efforts are required of the lathe operator. Now individual plants among those that have received independence are undertaking to make the devices of V. Trutnev.

In recent years an acute shortage of measuring tools of mass application—plain and thread gauges of all types—has been felt at plants of the country. The Moscow

Kalibr Plant, which at one time produced 1.5 million gauges a year, has nearly halted their production and has changed over mainly to the production of instruments. The Zaporozhye and Chelyabinsk tool plants are making infinitesimally few of them and they are of low quality. The instrumentation services of the purchasing plants are rejecting their gauges. The thread gauges, which we now have to buy in Bulgaria, are also of low quality and are inordinately expensive.

Fundamentally new, unusually wear-resistant gauges of all types and sizes were developed and introduced 10 years ago at one of the Moscow plants of the Ministry of the Electronics Industry. The new gauges are unusually lightweight, corrosion-resistant, and antimagnetic (which is necessary at a number of works of the instrument and electronics industries). Their wear resistance in work exceeds the wear resistance of well-known steel gauges by thirtyfold. The new items also have a number of other advantages over their steel counterparts. In durability they come close of hard alloy gauges, which no one produces, since the hard alloy is tungsten, an expensive strategic raw material.

The independence of enterprises, which perestroika gave them, produced unexpected results: USSR People's Deputy A. Chabanov, general director of the Rotor Scientific Production Association (Cherkassy), recently brought in the author of the new gauges. After the detailed study of the technological process of manufacturing the ceramic gauges by the management and specialists of the Instrument Firm (in the Rotor Scientific Production Association there are eight firms in various directions of production) the draft of a contract for the joint series production of the new gauges by the Rotor Association and the Moscow plant, where the production of the ceramic gauges was first assimilated, was drawn up. All the participants in this unusual business: V. Goncharov, director of the Instrument Firm, chief engineer V. Fitkevich, chief metrologist V. Kvasnikov, and thread grinder P. Kalenyuk, showed plain efficiency and an interest in the matter, which was completely new for them. Moreover, they decided everything without their general director, who at that time was addressing the Congress of People's Deputies in Moscow. Obviously, A. Chabanov had taught them very well independence in all questions of production. In this case the fresh wind of perestroika is also being felt.

SOTSIALISTICHESKAYA INDUSTRIYA several years ago reported the ordeals of V. Moiseyev, a lathe operator and inventor of the Moscow Toros Production Association (the former Torgmash Production Association). His clamping devices for metal-cutting machine tools, in the estimation of experts, surpass in their operating data Japanese items of such a type, which are the best in the world. And all the same the omnipotent Ministry of the Machine Tool and Tool Building Industry for 15 years refused to series produce them.

This year on the initiative of V. Romanov, director of the All-Union Scientific Research Tool Institute, at the

pilot plant of the all-union scientific research institute they produced a test batch of the new clamping chucks of V. Moiseyev. All of them were tested at the Moscow Motor Vehicle Works imeni A.I. Likhachev and are on the eve of series production.

This is also a wind of perestroyka. But for the present not everything is within its power. Unfortunately, there still exists the notion that invention is something like a game of dominoes during lunch break. But if one thinks it over: the well-being of the country depends on an abundance of goods and food products. What and who can create abundance? At present only new equipment and inventions. There will be no abundance, if a shovel and a wooden rake are in the

hands of the peasant. It will not be, even if with this shovel and rake he changes over to the lease contract or cost accounting. But if we give him, say, a minitractor with 50-shift hitch assemblies just in case and we put in the hands of the worker of industry an unusually productive and wear-resistant tool, a portable computer, and an advanced machine tool, which is equipped with inventions of our innovators, then we will experience genuine abundance among all the sectors of the national economy.

It was K. Marx who wrote in his works: "The might of the state depends...also on the number of introduced inventions, by means of which science makes the forces of nature serve labor."

**Progress of New Financing Methods in UkSSR
Academy of Sciences
18140256 Kiev VISNYK AKADEMIYI NAUK
UKRAYINSKOYI RSR in Ukrainian No 4, Apr
89 pp 3-6**

[Report by AN USSR [UkSSR Academy of Sciences]
President Academician B.Ye. Paton at a meeting of the
UkSSR Academy of Sciences Presidium]

[Text] On October 15, 1988, the USSR Council of Ministers adopted a decision "On Switching Over Scientific Organizations of the USSR Academy of Sciences, Academies of Sciences of Union Republics and the State Committee for Public Education to New Financing and Economic Methods".

The document had been in the development stage for over a year, because as early as September 30, 1987, a decision of the CPSU Central Committee and USSR Council of Ministers was published that dealt with the need to develop proposals on gradual switch-over of Academic scientific institutions and organizations to new financing and economic methods, with consideration given to specific aspects of their activities.

The decision draft was redrafted many times. Unfortunately, the provision that the State budget appropriations for basic research will increase twice as fast as the national income disappeared in the approved version. Neither does the document contain specific numbers on financing of the academic science in 1989-1990.

Be it as it may, the decision has been adopted, and it delineates a number of principle aspects of switching our institutions over to new financing and economic methods. We must now decide how we shall organize its fulfillment in our Academy.

I must stress that certain work has already been performed along these lines. The Ukrainian SSR Council of Ministers agreed in the summer of 1987 with our proposals on developing Republican programs of basic research on the most important scientific problems and approved a list of the problems. It was decided to discontinue the use of five-year and annual Republican plans in the field of natural and social sciences.

The proposed changes in the system of planning and financing of scientific research were widely discussed in AN USSR Sections and Departments and in several leading Institutes. Remarks and suggested amendments were for the most part taken into account in the draft of the Presidium of the UkSSR Academy of Sciences decision we are discussing today.

I shall now dwell on key aspects of the new decision of our Government. First of all, the decision has to a certain degree put to rest discussions on switching academic science over to full cost accounting and self-financing. The State budget will allocate resources for basic and applied research and development on the

assignment of State S&T programs, the Integrated Program of S&T Progress of CEMA Member Countries (KP NTP SEV), plans of interbranch S&T complexes (MNTK) on the most important scientific and S&T problems, and basic research programs of the AN SSSR [USSR Academy of Sciences] and Academies of Sciences of Union Republics.

A new in principle aspect is that funds will be appropriated from the State budget for initiative basic research; the research subject areas will be independently determined by scientific institutions themselves. This research should be conducted in order to create advance scientific backlog and search for "growth points" and new directions scientists' attention should be concentrated on.

It has also been allowed to create reserve funds, allocated from the State budget, for financing of the most important research if the need arises in the middle of a year. These funds can also be used for accelerating work performed in accordance with basic research programs.

A determining aspect of the adopted decision is the repeal of financing for simple and direct upkeep of scientific organizations and switching over to specific-purpose financing of specific programs, subjects and initiative basic research on a competitive basis.

I should note that this approach is not exactly new for our Academy, because we have been conducting subject-oriented research planning, and basic financing of scientific institutions is clearly tied to all subjects an Institute is working on.

The new aspect in institute financing is the creation of profit, both by savings of State budget funds according to scientific research budgets and cost-accounting activity in accordance with customer contracts.

Central planning and financing bodies will determine for AN SSSR and Academies of Sciences of Union Republics standards for creating the payroll fund, and the standard, the same for all scientific organizations, of payments from profit to the State (and particularly to the local) budget, as well as profit distribution procedures.

I would like to bring to your attention the fact that the decision provides for switching over to new economic and financing methods as of January 1, 1989. In other words, all new aspects of distributing financing among programs and subjects, formation of basic research subjects in institutes and the competitive basis for distribution of funds are being introduced as of January 1, 1989.

What kind of changes must happen here?

First of all, we must change the procedure of forming research subject plans.

We have known all along that the division into the most important and agency-type and to a certain extent into nature-social and S&T subject areas is rather conventional, as there are no clear criteria in this respect. It was

mainly a formal division that did not reflect the real-life situation. From now on the degree of importance of research subjects will only be determined by their inclusion into programs or plans at the respective level. One will treat as the most important assignments of State and Republican specific-purpose S&T programs and basic research programs, KP NTP SEV, MNTK plans, and individual assignments by directive bodies.

Another essential aspect is the formation of basic research subjects. The USSR Academy of Sciences has already decided on the distribution of funds for basic research among its Departments. On the average, their share is equal to 14 percent of the total volume of budget financing for 1989, although it varies among Departments, from 10 percent for the Nuclear Physics Department to 41-44 percent for the Departments of the Social Sciences Section.

It is my opinion that such ratio of standards for basic research subjects is fully justified. It is well known that the share of basic research subjects for arts institutes and theoretical profile institutions must be higher. However, I think that for our Academy as a whole the share of appropriations for basic research must be much higher than it is now in the AN SSSR. We know that even for branch S&T institutes this standard is about 20 percent.

In our Academy, the switch-over to standard-based planning of basic research subjects will be somewhat more complicated than in the AN SSSR. This is first of all due to the fact that we already conduct subject-oriented planning, the subjects have been approved, and the work is being conducted. Therefore one should form basic research subjects by freeing up funds as S&T works are being completed (in 1988 it was approximately equal to R20 million), and by reviewing subject areas at institutes.

However, the Science Organization Department of the AN UkSSR Presidium in cooperation with AN UkSSR Sections and Departments must in the shortest time possible submit proposals on standards for allocating funds for scientific institutions for conducting basic research, so that the institutions can review in 1989 their subject areas according to the AN UkSSR agency plan and form basic research subject areas on the standard basis.

Formation of basic research programs by Academies of Sciences of Union Republics must become a fairly important aspect in the research planning system. As a matter of fact, this is an agency's order for conducting S&T work. Proposals of scientific institutions will be examined and funds will be distributed on a competitive basis.

As far as this latter statement is concerned, there are different opinions. One might argue that we have been deprived of the right to give our own orders to institutions under our jurisdiction. However, all Ministries and agencies have centralized funds for the development of science and technology and they do distribute them on a

competitive basis, so we can also use this analogy. On the other hand, situations can happen when even good works that have passed the scientific research stage do not make it for some (not always objective) reason to Union-level programs. What is one to do in such a case? Curtail the research? This is where we must provide for forming our own programs or individual subject areas that would be part of an agency order.

I would also like to bring to your attention the fact that budget allocations along the lines of State orders will be mostly appropriated for the USSR State Committee for Science and Technology and AN SSSR programs. However, even now one is going overboard as far as the number of these programs is concerned. I think that in the future their number will decline. Under these conditions agency orders will make it possible for our science Departments to work out a certain "guarantor" system. So far we look like blind kittens in this area.

However, I do not want anybody to get an impression that an agency order will be kind of an umbrella for non-promising or non-topical subject areas. A competitive character of including all levels of plans in S&T work envisages both their competitive character and severe competition. As the competitive selection system and the objectivity of expert evaluations improve, cases when scientific divisions that do not provide the required research level will be disbanded are not out of the question. Of course, this is not the most pleasant exercise, but we must look a situation in the eye and not be afraid of such eventualities. The lack of initiative and competence of certain scientific collectives and their long-term parasitic existence due to being able to give pseudo-scientific explanations of their creative insolvency cost the State and science too much. Another outcome could be changing the profile of such institutions, and they should be ready for this.

After switching over to new working conditions the independence of Science Departments and Institutes and their rights in areas of research planning and financing will increase considerably. Here, they must display initiative and show their responsibility.

Of course, we have virtually no experience in solving the new problems, for instance, in competitive selection of works and resource distribution. To a certain extent, one can view as the first steps our participation in the high-temperature superconductivity program being developed now and in the formation of State basic research programs by the AN SSSR. But even these first steps confirm convincingly that one must work actively. For instance, there are data already that indicate that active participation of representatives of the Ukrainian Academy of Sciences in Scientific Councils on AN SSSR programs and persistent stands taken by some Academician Secretaries of our Departments have made it possible to substantially increase the AN USSR share in additional budget financing allocated per these programs.

I would like to emphasize that the draft under our consideration is but the first response to the Government's decision. This is the beginning of restructuring of the financing and economic system in the academic science. We will discuss this problem during the coming Session of the General Meeting of the Ukrainian SSR Academy of Sciences. The transition to new methods will be rather protracted, and all members of the AN USSR Presidium, staff divisions and of course scientists and employees of Academic Institutes must work seriously on this problem.

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Academy Institute in Kirghizia Threatened With Closure

907A0027A Frunze SOVETSKAYA KIRGIZIYA in
Russian 12 Oct 89 pp 1, 2

[Interview with First Deputy Chairman of the Kirghiz SSR Council of Ministers Mukun Aseyinovich Aseyinov by KIRTAG correspondent V. Niksdorf under the rubric "A Topical Interview": "Under the Little Wing of the Academy"; date and place not given; first two paragraphs are SOVETSKAYA KIRGIZIYA introduction]

[Text] At its meeting the Presidium of the Kirghiz SSR Council of Ministers examined the question "On Serious Irregularities in the Work of the Kirghiz Affiliate of the Center of Scientific and Technical Activity, Research, and Social Initiatives attached to the USSR Academy of Sciences (KF TsENDISI)."

The Presidium of the Kirghiz SSR Academy of Sciences was charged jointly with the TsENDISI of the USSR Academy of Sciences to settle the question of the immediate closing of the affiliate and its subdivisions.

Niksdorf: The decision is quite harsh and principled. Why was it necessary to agree to such steps?—the interview of the KIRTAG correspondent with First Deputy Chairman of the Kirghiz SSR Council of Ministers M. Aseyinov began with this question.

Aseyinov: Let us look at the root of the matter. Very many new organizations—scientific, public, and political—are now being established everywhere. But often several of them declare some goals and tasks, but actually deal with completely different ones. It seems to me that in this case we were faced precisely with this.

As is evident from the name of the TsENDISI, this public organization encompasses various aspects of activity. But first of all it should deal with the solution of scientific, technical, ecological, and other socially important problems. The scientists, who are members of the management of the Kirghiz Affiliate of the TsENDISI, which was organized in March 1989, should have

focused their basic attention precisely on science. Incidentally, all of them are personnel of the Institute of Inorganic and Physical Chemistry of the Kirghiz SSR Academy of Sciences.

Niksdorf: But might precisely this also be good? After all, chemical scientists are doing much that is useful for the solution of many national economic problems?

Aseyinov: I agree with you. But if only the TsENDISI had given some new stimuli to their work, if only it had drawn into the orbit of useful activity new creative collectives! Incidentally, I will talk about collectives later. As to the themes, which are being elaborated by the Kirghiz Affiliate of the TsENDISI, they are financed from the state budget, and the achievement of not only the end, but also the intermediate results was at the expense of the state. Here the equipment and funded materials of the Institute of Inorganic and Physical Chemistry are being used to the utmost, but the corresponding depreciation costs are not being reimbursed.

Niksdorf: In other words, are our scientists, while on the staff of the affiliate of the TsENDISI, performing the work which they should do as associates of the Institute of Inorganic and Physical Chemistry of the Kirghiz SSR Academy of Sciences?

Aseyinov: I could cite examples of precisely such activity. But a scientific theme can encompass a quite wide range of problems and consist of various fragments. Precisely they were performed under the aegis of the Center. As for the assets, which are being received for such work from the state budget, I want to recall that the Center should operate, in conformity with its charter, differently—on the principles of self-financing, cost recovery, and full economic independence.

Niksdorf: Does it turn out that for the work, which is financed by the state, some people are actually receiving money twice—both at the institute and at the affiliate of the TsENDISI?

Aseyinov: They are. And it is not bad. Evil tongues joke in this regard that our chemists again "used a lot of chemistry," but, it seems to me, it is possible to go rather too far with such jokes. If we call a spade a spade, there is a skillfully devised mechanism of the enrichment of a certain portion of the people at the expense of the state.

Niksdorf: And how does this mechanism work?

Aseyinov: Very simply. The financing of developments, as was said above, comes from the state budget. But the affiliate of the TsENDISI receives the revenue from the introduction of developments in full, only 5 percent goes to the state budget. All the rest is distributed among the personnel of the TsENDISI, among its affiliates and subdivisions.

Niksdorf: But what about the presidium of the academy? For these operations, which look rather like commercial operations, take place under its very wing, do they not?

Aseyinov: It does not matter. For the academy, in essence, does not have any revenue from the TsENDISI, but no one is worried. I believe that if full cost accounting were in effect here, then they would register every kopeck.

Incidentally, in connection with the establishment of the TsENDISI a legitimate question arises: at one time introducing centers were established under the academy for the introduction of scientific developments in the national economy. It is possible to increase their number at will. But at the Kirghiz SSR Academy of Sciences they do not want to take this path.

Niksdorf: Is it perhaps because there is no such freedom in financial operations?

Aseyinov: Apparently, that is the whole point. And now let us talk about the collectives that function under the scientific center.

Dreadful things happen at times. The Kirghiz Affiliate of the TsENDISI had only to appear, when several former cooperatives, which had managed to compromise themselves, were closed, but with the help of chemical scientists as if drank down "the water of life"—and revived, began to be attracted to it like a magnet. True, in a slightly different capacity, having changed in order to lend themselves a certain respectability, a certain mask. For example, what could you say about the Salamat Scientific Production Agricultural Firm, which was organized within the TsENDISI on 24 July 1989?

Niksdorf: But now the introduction of scientific developments in agriculture seems very important. Precisely this was also spoken about at the interrepublic seminar-conference, which was held in Kirghizia a month ago.

Aseyinov: But in the Salamat Firm science is not in the air. Although in the general provisions of the charter of the newly appeared agricultural firm it is stated that "departments and institutions of the Kirghiz SSR Academy of Sciences and the USSR Academy of Sciences carry out the scientific methods supervision"—neither more nor less! But what are the basic tasks of the firm? The procurement of fodders, seeds, fish, and agricultural produce—and trade in its own products not only in the republic, but, as is stated in the charter, throughout the territory of the USSR.

Niksdorf: For some reason this firm reminds me of an ordinary trade and purchasing cooperative....

Aseyinov: You guessed right. Precisely the present Salamat Firm previously was called the Alma Cooperative and was registered 2 years ago in the Oktyabrskiy Rayon Soviet Executive Committee. It operated brazenly: it bought up and resold agricultural products without their additional processing, without taking into account the demand of the population. The activity of the Alma Cooperative resembled speculative activity. They bought things at a little lower price, sold them at a little higher price, and divided the proceeds.

Having been transformed into Salamat, the cooperative (or agricultural firm!) is engaging in the same thing. The following facts are cited in a report submitted by the Frunze city financial administration to the republic Council of Ministers. They bought spring onions in Turkmenia at 34 kopecks a kilogram and sold them in Perm Oblast at 60 kopecks a kilogram. They bought apples in Dzhabul Oblast at 70 kopecks a kilogram and sold them in Frunze at a ruble a kilogram.

Incidentally, about apples. While still Alma, the cooperative, in order to create the semblance of concern for its own raw material base, concluded a contract with the Sovkhoz imeni Kalinin of Issyk-Atinskiy Rayon for the leasing of a fruit-bearing apple orchard with an area of 30 hectares. They correctly say that paper will endure everything. The Alma Cooperative did not obtain a single kilogram of apples from its own orchard.

Now, having become Salamat, the cooperative-agricultural firm again recorded in the charter a paragraph on the cultivation of a leased orchard. But this, as it turned out, is mere words. At the time of the check, in September of this year, there was no contract on the leasing of an orchard.

I also want to add the following detail. Zh. Zhumaliyev, who was previously convicted of committing mercenary crimes, was in charge of the Alma Cooperative. It would seem that the path to obtaining the director's chair should have been blocked for this person. But, as you have probably already guessed, precisely he, Zhumaliyev, who now held the position of director and procurement agent, became the main character in the Salamat Agricultural Firm.

Niksdorf: The Alma Cooperative probably needed, as they say, a new cover for the continuation of its former activity, and it aptly chose the scientific "roof."

Aseyinov: A connection with science tempts simply everyone! Chemical scientists also sheltered the former Yevraziya Trade and Purchasing Cooperative, which in April of this year was closed by a decision of the Leninskiy Rayon Soviet Executive Committee of Frunze. Not 3 months had passed when the Soyuz Agricultural Firm was organized on the basis of the Yevraziya Cooperative—and, of course, in the charter there were the same provisions "on the introduction of scientific and technical developments of the USSR Academy of Sciences, the Kirghiz SSR Academy of Sciences, and other creative collectives." Incidentally, in reality the newly appeared comrades in arms of science usually engaged in different types of trade and purchasing operations. Serious financial irregularities were also established here by a check.

The Informkuststvo Board of Cultural Entertainment Programs was established with the rights of a department of the TsENDISI. I, honestly speaking, do not understand at all what the organization of concerts of masters of the arts, popular stars of Soviet and foreign variety, the theater, the movies, and television, which is spoken

about in the charter of the board, has to do with scientific and technical problems.

For the most part it engaged in the showing of a number of movies, having assumed in essence the functions of film distribution. It is clear that the tickets were sold at an extremely high price, the posters lured people to pictures with topical subjects—"Intergirl" and "Black Moon Rising," while the board had time only to count the monetary revenue.

It is not necessary to have much intelligence in order to show a ready-made movie that was filmed in Moscow or Leningrad. But to derive from this considerable income, while professing the principle "we, too, were plowing"—initiative, experience, and quickness are needed here. And general director S. Soloninkin, who previously headed the Zvezdochka Cooperative, which was closed by a decision of the Pervomayksiy Rayon Soviet Executive Committee, has quite enough of these qualities.

A check showed that Soloninkin is not changing his customary style—there are irregularities in accounting, taxes are not being withheld from the wages of personnel, the return of money, which was issued on account, is not being monitored, there is no record keeping of the availability of tickets.

Under the board many people are living very decently, receiving considerable sums in cash, seeing that the money is flowing like a river. Thus, projectionist G. Zhigan earned a quite good additional amount. According to the rates of the USSR State Committee for Cinematography, 2 rubles are supposed to be paid per showing. The board paid him 15 rubles each showing. In August this projectionist, without exerting any particular efforts, received 915 rubles. They paid one of the drivers for 2 days of work no less—1,105 rubles. But is this really remuneration according to the labor?

As you see, the board worked in the old traditions of the Zvezdochka Cooperative, when from the concerts of visiting celebrities the organizers of the guest performances received a very considerable sum.

Niksdorf: But, you will agree, the audience member in the province also wants to have the opportunity to see and hear famous performers.

Aseyinov: However, we do have organizations, for which this activity is basic. It is possible to establish the corresponding cooperatives under them. But what do concerts or screenings of movies have to do with science? You correctly observed that enterprising people, who have smelled money, are seeking a cover, so that it would be possible to engage peacefully in enterprising activity and not be particularly conspicuous in so doing to various inspecting organs. The Kirghiz Affiliate of the TsENDISI, as its director V.G. Dudakov, head of a laboratory of the Institute of Inorganic and Physical Chemistry, acknowledged, without exerting particular efforts, also has from this friendly alliance a benefit—the

Informskusstvo Board deducts 25 percent for the centralized fund of the TsENDISI, while the Salamat Agricultural Firm deducts 12 percent.

Moreover, the TsENDISI has concluded four contracts with people who have video recorders. For the establishment of such a "convenient roof" these people, who received permission for the showing of video movies, should each pay 600 rubles monthly to the cashier's office of the Kirghiz Affiliate of the TsENDISI. All the rest goes into their own pocket.

Niksdorf: By hook or by crook.... In what, Mukun Aseyinovich, do you see the main cause of the perversions of this sort, which concern no longer just purely cooperative activity, but also scientific activity?

Aseyinov: Apparently, several comrades have become dizzy from the opportunity to obtain considerable monetary assets quite easily.

Let us speak frankly: Are we really opposed to the development of the cooperative movement? Of course not. If it is organized on socialist principles and unites civilized cooperative members, if not the derivation of excess revenues, but the saturation of the market with new goods and the rendering of additional services are made the cornerstone, cooperation becomes an important sector of our economy. We support such principles of cooperative activity.

Likewise, who can object to the establishment of an organization, which promotes the introduction of scientific developments in production?

But it is necessary to do an honest job with honest hands. Otherwise deformations and the intensification of speculative trends, which evokes the deep indignation of Soviet people, are inevitable.

As we see, correct and noble tasks and goals are frequently declared, but in fact people are concerned only about deriving large profits and receive in essence an unearned wage. In this case that is how it happened.

At times we treat with contempt various kinds of instructions and decrees, believing them to be only the office handiwork of the bureaucratic apparatus. Meanwhile today precisely the absence of control and deviation from established order are getting in the way of society. The Kirghiz Affiliate of the TsENDISI grossly violated the decree of the USSR Council of Ministers, which specified that public and cooperative organizations are established after the preliminary consideration of these questions by the Councils of Ministers of the union republics. Sensing the absence of control, neither the Center nor its subdivisions registered their activity with executive committees or financial organs. The Presidium of the Kirghiz SSR Academy of Sciences actually also kept aloof.

Incidentally, I want to say with all certainty that the conditions for the obtaining of significant "easy" revenues were created not only in the affiliate, which is being

spoke about. In many cooperatives they also forget the principles of distribution according to labor. As a rule, the people, who are directly engaged in the production of items at various jobs, receive much less than the members of cooperatives, who only engage in intermediary activity. In essence we are faced here with the exploitation of hired labor, no matter with what contractual obligations it is disguised. I believe that our economics scholars should also arrive at such a conclusion.

As to the gross violations in the financial and economic activity of the Kirghiz Affiliate of the TsENDISI, it has been recommended to the Kirghiz SSR Committee of People's Control, the republic Procuracy, and the republic Ministry of Internal Affairs to examine the materials of the check. We can no longer tolerate cases of undisguised and shameless gain and the distortion of the norms of socialist morality.

UzSSR Faces Widespread Replacement of Automated Systems

907A0008A Tashkent PRAVDA VOSTOKA in Russian
9 Sep 89 p 2

[Interview with Academician of the Uzbek SSR Academy of Sciences Vasil Kabulovich Kabulov, general director of the Uzbek Kibernetika Scientific Production Association, by PRAVDA VOSTOKA science observer S. Fioletov under the rubric "Scientific and Technical Progress Is the Arsenal of Creation": "Informatization Is the Habitat"; date and place not given; first paragraph is PRAVDA VOSTOKA introduction]

[Text] Thus, the computer—one of the amazing creations of scientific and technical progress—today has become for many people a helper. And then what? In the middle of June the All-Union Conference, at which the most prominent scientists of the country examined several versions of the concept "The Informatization of Society," was held in Moscow. Our republic also presented its generalized version. Scientists of the Uzbek Kibernetika Scientific Production Association of the Uzbek SSR Academy of Sciences formulated it. What sort of concept is this—S. Fioletov, science observer of the newspaper, and Academician of the Republic Academy of Sciences V.K. Kabulov, general director of the association, talk about this.

Fioletov: Vasil Kabulovich, over the several decades, which have passed from the development of the first computers to today, both computer technology and the science of management by means of it—cybernetics—have made a giant leap in their development. But now there is a new combination of words—information society. What is this?

Kabulov: Mankind lives in a world of information. All members of society, regardless of their social status, use it and knowledge in their activity. However, the flow of information is growing like an avalanche. Whereas, say, in the middle of the 1970's it doubled in approximately 5 years, 10 years later it doubled in 2 years. It is

becoming physically impossible for man to process this entire volume himself. Thus an information strain is appearing.

But it led to progress in the field of computer technology, which is phenomenal in scale and speed.

Thus, at the qualitatively new stage of the development of the economy informatization is becoming the greatest value, the main product of production, and a basic commodity. The knowledge, which has been accumulated by society, including the knowledge of specialists, is becoming a national resource, which determines the socioeconomic might of the country.

Fioletov: It turns out that the informatization of society is the global social process of the generation and universal use of information.

Kabulov: Exactly.

Fioletov: And all the same let us drop to the level of the specific user. What, for example, can informatization give me as a journalist?

Kabulov: You deal with the popularization of science. But, in order to present competently some material or other, specific knowledge is required. How do you obtain it today? You read specialized literature and scan the publications of other authors on the theme of interest. But you are incapable of taking in everything.

It would be possible to take another route, if you have a professional computer which is linked to a bank of scientific data. The press of a key, and all the information of interest to you is on the display screen.

Fioletov: Incidentally, abroad such systems already exist....

Kabulov: True. Now let us examine your information needs at a different level, the purely everyday level. The computer could also help you in this. Moreover, today the concept of an automated system of noncash transactions for municipal and personal services has already been developed. The republic savings bank is prepared to being introduction, while in the Ukraine this work has been performed now for about 2 years. In this connection I will cite interesting figures: in the United States the share of noncash transactions comes to 95 percent, in the GDR—65 percent, and in our country—3.2 percent.

The third, so to speak, social level. The settlement of some socially significant question interests you as a citizen. The personal computer will be linked to the data bank of the appropriate management organs and ministries. But this is not enough for you, you would like to voice your own opinion and to make a suggestion. Certainly, again by means of the computer.

Fioletov: The picture, which the informatization and computerization of society hold out, is impressive. Although under our conditions it is for the present more like a fantasy—we have fallen so severely behind the

developed countries of the West. And we will touch upon this problem yet. I would now like to discuss another aspect of it. The informatization of society presumes not only specific steps in the saturation of the market with computers, programs, and communications equipment, but also the increase of the information and computer culture of the population.

Kabulov: That is why it is necessary already today to undertake the formulation of a comprehensive program of the training of the population. The sources of financing and the forms and methods of promotion should be clearly specified in it. Of course, the mass media should also join in this matter. Practically all this work should be aimed at the training of a new generation of people, for whom computer literacy will become an integral part of their education, while informatization will become a natural habitat.

Fioletov: This is one side of the matter. The other one, in my opinion, concerns the reorientation of the use of computers at enterprises and in ministries toward the needs once again of man.

Kabulov: I fully agree with you. Today hundreds of computers, which operate in sectors, are busy with accounting calculations and statistical reporting. Hardly anywhere are computers really aiding management. You will encounter even more rarely a computer-adviser.

Today the manager knows better how many tractors or how much saltpeter the enterprise has produced than how its workers are provided with housing and personal services and how they are supplied with foodstuffs and day-to-day goods. There is a similar picture at the level of ministries and departments. In your newspaper you published not that long ago the report "Caviar, Coffee, Cured Sturgeon Fillet." It is related in it how the workers' control reveals a hidden shortage. They came and found—a shortage appeared for a while at the counter. They left, everything remained as of old.

Let us examine the situation in light of our conversation. The Ministry of Trade and Uzbekbriyashu have data banks on all products, which arrive in the republic and are produced locally. And these data banks are linked with personal computers of the committees of people's control, with stores, and with computers of residents of the republic. At any moment everyone can find out where, at what store the same coffee, caviar, and cured sturgeon fillet have arrived. Are inspections needed under these conditions?

Fioletov: Let us return to the problem of the material and technical support of the concept. I want to cite a few figures, so that the reader could have an idea of how difficult its solution is. For example, the share of computer hardware in the USSR gross national product is extremely small.

Kabulov: Unfortunately, all that is so. And still we have a base for rapid progress. Let us take the republic. A quite powerful production infrastructure has been developed

here: the Foton Association, the Mikond, Algoritm, Kinap, and other plants. The whole trouble is that they belong to different departments, the interests of which often do not coincide.

Fioletov: What is the solution?

Kabulov: Life itself and perestroyka suggest the solution. It is necessary to establish on their basis an extradepartmental concern and to direct its efforts first of all for the saturation of the market with personal computers of different versions.

Fioletov: However, there is one "but" here. The element base of many models, which are being produced in the country, today is also obsolete. New scientific, technical, and technological solutions are necessary. And, so it seems to me, the Uzbek Kibernetika Scientific Production Association could help in this.

Kabulov: Of course. And we have something to offer. The work, for example, in the area of artificial intelligence, the development of the theory of the design of fifth-generation computers, personal systems, and data transmission systems is proceeding successfully. Incidentally, we recently signed with Indian colleagues an agreement on the start of the production on the basis of our scientific production association of printers—printing devices—and personal computers. The work in the area of the problems of simulation, systems analysis, and the computer experiment, in my opinion, is of very great importance. It is a question of the development of mathematical models of the optimum functioning of the economic mechanism under the conditions of cost accounting, the Aral Sea, and so forth.

Moreover, in the republic there is also a technical base of informatization, the republic automated management system—the RASU.

Fioletov: Yes, but many disputes are being carried on around it. Opinions about its inefficiency are being voiced....

Kabulov: Any new matter, and especially such a complex, constantly developing formation as the republic automated management system, evokes disputes. I will briefly say what this is. Its first section was established during the 10th Five-Year Plan, the second was established during the 11th Five-Year Plan. Whereas in 1979, 60 computers, for the most part second-generation computers of the Minsk series, had been put into operation, by 1986, 117 computers, 40 of which are third-generation machines of the YeS series, were already operating. The second section of the republic automated management system included 32 automated management systems, including 6 intersectorial and 2 territorial systems.

The interaction of the functional units of the automated management systems of ministries and departments with the head system, the ASPR—the automated system of planning calculations—consisted in the exchange of data

and the accomplishment of a large number of all kinds of tasks. Moreover, the flow of information within the republic automated management system ran both vertically—from the State Planning Committee to ministries and enterprises, and horizontally—between enterprises and ministries.

Fioletov: What is the reason that in recent years all the work on the republic automated management system has been halted?

Kabulov: During its establishment many blunders, the main ones of which, in my opinion, are organizational, were made. The republic automated management system was established on the basis of an assignment of the USSR State Committee for Science and Technology and decrees of the republic government. However, the main thing was not done—the client, which only the Council of Ministers in the person of the State Planning Committee can be, was specified. While its chairman should be the chief supervisor of the work. A council for the republic automated management system, of which the scientific supervisor and the chief designer should be members, is necessary under it. That is, a coordinating center, which has full legal power, is necessary. They acted that way, incidentally, in all the other republics where republic automated management systems are being established.

Our lack of all this had the result that the State Planning Committee and its computer center in essence left the republic automated management system. Leapfrogging and confusion began in ministries and departments. The system is gradually falling apart.

Fioletov: And still the republic automated management system is a very specific system, which does not reach the ordinary user, while the tasks, which are being performed by it, are different from the tasks of the informatization of society.

Kabulov: But I am not denying this. The republic automated management system can become only a base. You will agree that it is easier to erect a building on a foundation than from scratch. And in this connection I would like to return to the conference, which was held in Moscow and at which alternative versions of the concept of the informatization of society were examined. This work is being conducted on the order of the Politburo of the CPSU Central Committee. Our version was generalized, that is, it took in all the best of the others, but reflected our own view of the problem. On its basis we formulated the concept of the informatization of the Uzbek SSR and submitted it to the republic government. I will not dwell on all its aspects, I will merely say that, in addition to the basic ideas and principles of informatization, the priority directions, the infrastructure, and the mechanism of informatization are clearly specified in it. But the main thing is that without the informatization of the republic the cost accounting economic mechanism will not be able to function efficiently. For the cost accounting of Uzbekistan is also not far off. Moreover, in

our opinion, informatization should lead the introduction of cost accounting principles. While they, in turn, should encompass all the units of not only the economy, but also ministries and departments, even the mass media. Why, for example, does your newspaper not become the first in this matter?

Fioletov: Yes, the idea is tempting....

LiSSR Scientists Union Holds Founding Congress
907A0022A Vilnius SOVETSKAYA LITVA in Russian
10 Oct 89 p 1

[Article: "In the Name of Science"]

[Text] The constituent congress of the Union of Scientists of Lithuania was held on 7-8 October at the Republic Palace of Culture of Trade Unions.

The opinion about the state of Lithuanian science usually formed on the basis of the recognized international conferences, which are held in our republic, the well-known "Lithuanian schools" in individual directions of it, and the significant number of recognized authorities. Articles about the alarming state of Lithuanian science, which is divided among departments, has been squeezed into the narrow course of administrative command, and has lost its humanistic function, began to appear in the pages of the press only in recent years. As one of the speakers at the congress put it graphically, people appealed to science in case of an incurable disease or used it as a whip in order to spur on the horse that is pulling the cart in the required direction. The anxiety about the future of science also prompted hundreds of specialists of the republic to seek fundamental and immediate methods of its perestroika.

In the early 1940's Lithuanian science suffered great losses, as did the entire culture of the people—its best representatives emigrated from Lithuania or died in exile. Lucid individuals also existed during the postwar decades, they also exist in our days, but there could have been significantly more of them. The congress participants spoke with alarm about the fact that in science the bureaucratic command and order style, which led to anemia in its various fields, is unacceptable. In the reports and discussion the scientists appealed for radical perestroika in science, for the specification of the priority directions of its development, for the elimination of the long-established barriers between institutes of the Academy of Sciences, higher educational institutions, and sectorial institutes, and for the creation of the conditions for the revelation of talented people. For today we have comparatively few capable young people, there are not enough serious scientific works for specialized publications.

At the congress the program and charter of the Union of Scientists of Lithuania were adopted, the council, of which two representatives of Lithuanians abroad are members, was elected.

Second Secretary of the Lithuanian CP Central Committee Vladimir Berezov attended the congress.

Doctor of Philosophical Sciences Professor Bronyus Kuzmitskas was elected by a show of hands as chairman of the Union of Scientists of Lithuania. An ELTA correspondent asked him to describe the immediate tasks of the Union of Scientists of Lithuania.

"The organization should be the connecting link between all the forces of scientists of the republic and thereby between various scientific institutes—academic and sectorial institutes and higher educational institutions. Apparently, academic institutes should be left as they are, since they have gained much scientific experience, have established a technical base, and are furnished with modern scientific equipment. But a part of

this scientific potential should be transferred to educational institutions, so that instructors and students could spend a part of the working time in the laboratories of academic institutes. This has been started.

"It is necessary to see to it that higher educational institutions and scientific institutions, after securing their status, would acquire independence from the center and would take all the work in their hands. The reform of science is a component of economic independence and is following the same path.

"The Union of Scientists of Lithuania intends to restructure science in such a way that the talent, personal interest, initiative, and moral and civic qualities of a person would acquire their former value."

Scientists Call for Changes in Academy's Electoral System

907A0012A Moscow IZVESTIYA in Russian 8 Oct 89
Morning Edition p 3

[Article by Doctor of Geological Mineralogical Sciences N. Bulin, Corresponding Member of the USSR Academy of Sciences L. Krasnyy, Candidate of Geological Mineralogical Sciences D. Milshteyn, and Corresponding Member of the USSR Academy of Sciences A. Shcheglov: "The Most Worthy to the Academy. This Will Be Possible Only in Case of Truly Democratic Elections"]

[Text] The unsatisfactory state of a number of fields of Soviet science cannot but disturb. And it is quite clear that the formed situation in many respects—if not mainly—is dictated by the state of the USSR Academy of Sciences, which should be the brain center of science and society. In turn, the possibility of fulfilling the functions of such a center depends entirely on the personnel of the academy and their competence, adherence to principle, and sense of responsibility for the fate of science and the country as a whole.

The questions, which were raised on the pages of IZVESTIYA (Nos 206, 256) by Academician Yu. Kosygin and Corresponding Member of the USSR Academy of Sciences A. Monin, are very urgent. In order not to repeat ourselves, let us note at once that we support the criticism of the existing procedure of the elections to the academy, which is contained in these publications, but also have our own proposal.

First of all the procedure of electing new members of the academy should be streamlined so that truly prominent scientists, who are already the leaders of promising scientific directions and are well known in domestic and foreign scientific circles, would become them. Here the "gross" approach, when a scientist is evaluated according to the number of publications, without proper consideration of the significance of the ideas contained in them and the share of his personal contribution to collective works, should be categorically eliminated. Only the novelty and depth of proposed and elaborated problems, their scientific value, and the applied results should become the basic criteria in case of nomination and election to the academy. The demands of the charter of the academy on its members should be specified and made more strict; it probably makes sense to abandon the division into academicians and corresponding members. And in any case the election of the president of the USSR Academy of Sciences should be carried out by all the members of the academy, including corresponding members.

It is necessary to stress the urgent need to increase the influx into the academy of scientists who are employed in sectorial science. In many sectors of the national economy research is being conducted and developments, which conform to the world level of development of the corresponding fields and govern genuine scientific and technical progress, are being successfully introduced.

Highly skilled innovators of science are concentrated at sectorial institutes. These people are the bearers and generators of important advanced ideas and scientific directions, their creative work is receiving extensive, including international, recognition, but how often they and their achievements are ignored by the academy "elite" and how exceptional and thorny their path is to the academy, a place at which they are by right worthy to hold! A substantial "injection" of fresh forces, which are directly connected with the main directions of the development of the national economy, would make it possible to link the basic and applied sciences more closely and to increase their potential on the way to their transformation into a productive force.

And, of course, it is necessary to make all the positive changes while using as much as possible the advantages of democracy and glasnost. But given the existing situation, when the procedure of publishing the lists of candidates in the central press has been abolished and too short a time has been established for becoming familiar with these lists, a straight discussion of each candidate is practically ruled out. Perhaps, it is necessary to enlist in the discussion of candidates specialized scientific councils, on which highly skilled specialists, who know well the state of specific scientific directions, work. In any case a tool, which will make it possible to take into account the opinion of a significant portion of the scientists of the highest skill, should be found.

The Presidium of the USSR Academy of Sciences should organize without delay the formulation of alternative versions of the new draft of the rules of elections to the academy and its governing bodies; these versions should be discussed extensively in advance by the scientific community. We support the proposal on the holding of the regular elections of members of the academy after the election of the new governing bodies, which should be in charge of perestroika in science. The question is too serious to justify haste in its settlement. Our future depends in many respects on the qualitative rejuvenation of the personnel of the USSR Academy of Sciences and the cardinal reform of the style and goal-orientation of its work.

Soviet Science Lag Attributed to Lack of Competition

907A0002A Moscow PRAVDA in Russian 19 Sep 89
2nd edition p 2

[Article by Academician V. Trapeznikov (Moscow): "Unchain Prometheus. On the Barriers in the Way of Science and Technical Progress"; passages in boldface as published; first two paragraphs are PRAVDA introduction]

[Text] Perestroika has posed a number of topical problems, which should be solved within a year or two. Pointed, at times excessively emotional debates have been focused on them. At the same time there exists a no less important, perhaps, not so vivid problem, on which the future long-term development of the country

depends. This is the questions of science and scientific and technical progress. Unfortunately, we have fallen behind the leading countries in the most important fields of science, engineering, and advanced technology. Although we do have substantial achievements, as a whole our lag is growing.

They have written about this, but I want to examine the more general global factors, which had an effect for a long time and impeded the development of our science. I see two such factors.

The first of them. Our country also abounded in creative minds, but after V.I. Lenin for many decades these minds were systematically destroyed and exiled.

V.I. Lenin treated talented people, people of intellectual labor as the most valuable resource of society and a mighty motive force of its development, which is of permanent importance. Back during the lean 1920's he established the Central Commission for the Improvement of the Life of Scientists. Unfortunately, we have forgotten this.

Understanding that essentially all technical achievements in our country would be based on science, V.I. Lenin commissioned prominent scientists to study underground stores and to identify mineral resources. He listened sympathetically to the opinion of scientists. In 1921 in accordance with the letter of Professor K.A. Krug and in connection with the plan of the State Commission for the Electrification of Russian V.I. Lenin issued instructions to build the All-Union Electrical Engineering Institute, which was well-equipped with foreign apparatus. At approximately that same time the Central Aerohydrodynamics Institute, which became the forefather of basic research in the field of aeronautics and hydrodynamics, was established.

V.I. Lenin foresaw the importance of science for the development of our country, but in subsequent years, after him, everything changed.

Stalin with his suspiciousness, who did not tolerate thinking, resourceful people, along with his political opponents systematically destroyed everyone who had his own opinion—writers, figures of art, physicians, engineers, and scientists. Thereby the creative potential of the country was continuously reduced. Only the Great Patriotic War and the need to develop atomic weapons forced Stalin to enlist an entire army of scientists in the accomplishment of this task.

After Lenin no one engaged properly in science. As a result various accusations of "pseudosciences" appeared and a half-disdainful attitude toward science formed. A general background of the lack of comprehension of its importance developed. Science and intelligence began to be regarded as an inconvenient makeweight which was getting tangled in the feet of the builders of socialism.

But at this time on the other side of the planet, in the United States, "they bought up brains." Japan formulated as a state strategy the development of science-intensive sectors.

But in spite of the lack of comprehension of the importance of science by high circles and the difficulties connected with this, Soviet science did develop, and in several fields of it we are at the world level.

Thus, the first factor of retardation in the development of science is the many years of the systematic destruction of minds and the lack of comprehension of the importance of intellectual labor and the role of science, which led to the decrease of the overall intellectual potential of the country. This has also had an effect to the present.

The second factor is the economic structural factor. With minor exaggeration it is possible to formulate it as follows: for decades no one in our country needed science, except devotees and defense sectors.

However, science is the foundation of technical progress. But scientific and technical progress can proceed actively only under the conditions of competition. A competing organization is forced to seize every innovation, otherwise it will fall behind and be ruined.

Competition is the only factor, which automatically acts in the direction of the use of the latest achievements of science and technology in production, the reduction of prices, and the increase of product quality. Here it is possible to call competition different things: contention, rivalry, a keen struggle, or otherwise.

In our country competition for decades was completely absent (there was a "taboo" on the very word). Competition is all the more impossible under the conditions of our longstanding shortage. Departmental monopolies, which impede progress, always existed in our country. There was always the priority of the producer over the consumer. So why should the monopolist producer manufacture something new, why should he assimilate the proposals of the academies of sciences and scientific research institutes, for people as it is will take what is old! Hence the practical lack of interest in innovations, in progress, and, consequently, in science, especially basic science.

During my 13 years of work in the State Committee for Science and Technology I do not remember a case of the timely fulfillment of the plan on new equipment. Reasons for postponing the deadline were always found. And I do not recall an instance, when at a meeting of the USSR Council of Ministers any minister was given a substantial reprimand in connection with the failure to fulfill the plan on new equipment.

Experimental shops, which were established by decree of the government for the development of new equipment, were kept busy, as a rule, with series output.

The only area, in which latent competition existed in our country, is the defense sectors. It was necessary to

continuously compare the speeds and ranges of our aircraft and so forth and those of potential enemies. Here competition had an effect, and, consequently, science, including basic science, was needed. And in these areas it actually developed well. However, the defense industry with its complete secrecy could not transfer its scientific and technical achievements to the civilian sectors of the national economy. Now, as we know, conversion is being carried out.

Thus, the second global factor, which impeded the development of our science, is the economic structure, which excluded the possibility of competition.

Many proposals were made on how to increase the efficiency of science, but there is no opportunity here to discuss them. I want merely to think a little about the means of overcoming the effect of the two factors that were discussed.

First about overcoming the consequences of the first factor—the destruction and the failure to use minds, the underestimation of science. There are several problems here.

The first one is the making up for what has been lost. Of course, it is impossible to plan the appearance of new talented people, and one should merely support in every way the young talented people, who are emerging in science, and in so doing get rid of the unpromising “men of science.”

The second. It is necessary through the mass media to explain systematically, in one form or another, that science, for all its major shortcomings, is the basis of scientific and technical progress, while scientists and specialists are the brain of technical progress. To make the broad masses aware that the prospects of the development of new equipment and new technology, the radical increase of labor productivity, and our progress originate precisely from science.

Now we are establishing mixed enterprises that are using foreign achievements. This is good, but it is necessary to remember that foreign firms are selling to us technology of yesterday and, at best, of today. Tomorrow the technology will be replaced, and we will again fall behind. It is impossible to catch up with a horse, and especially to overtake it, while holding on to its tail! It is necessary to think about the future and, if we want to attain the leading world level, it is necessary to create all the conditions for the development of domestic science.

The third. The total lack of provision of our science with equipment, instruments, and tools at the level of world standards is a serious factor that stems from the long-standing underestimation of science. One must not spare either rubles or foreign currency for the experimental base of our science.

Unfortunately, under the conditions of the self-management and self-financing of enterprises their demand for developments of science did not increase,

rather quite the reverse occurred. Economic stimuli for the increase of the quality of items or the output of new items did not appear for enterprises, with the exception of enterprises that export their products and, apparently, defense enterprises. Accordingly the demand for science also did not increase.

Indeed, the volume of commodity production, which is calculated in rubles (the same “gross”), is the main criterion that determines the size of all funds, including the wage and material incentive funds. Therefore, enterprises are more at ease and more confident in producing an old product, which under the conditions of the general shortage people will take all the same, perhaps a slightly updated product, with a changed merchandise type. In this case, of course, at a higher price.

It is clear that under the conditions of the shortage and the lack of competition an increase of prices and the “washing away” of inexpensive goods, which we are observing daily, are inevitable.

It is useless to introduce new equipment by administrative planning methods, we have already experienced this. Methods, which interest enterprises economically, are needed; they should be devised carefully. Perhaps, one ought to exempt from deductions to the state budget the expenses connected with the assimilation of new equipment; perhaps, one ought to make amendments to the tax system; perhaps, one ought to do something else.

It is necessary to study carefully the tax system of foreign countries, which is aimed not only at the withdrawal of money, but also at the speeding up of progress. For example, a tax on the amount of sealed vacuum was in effect in the United States. It contributed to the fact that firms found advanced means for reducing the amount of electronic and other vacuum instruments. The amounts, which have been donated for the support of scientific and other societies and various foundations, which do not yield the firm direct revenues, but create advertising for it, are also tax exempt. It is more advantageous for a firm to make such donations than to simply turn money over to the state as a tax. In general a well thought out tax system is one of the effective methods of managing the economy. And, of course, science.

The general conclusion: the reform at enterprises did not envisage real stimuli for the production of new equipment and did not increase the demand for science, inasmuch as they did not think in earnest about this aspect of the matter when drawing up the drafts of laws.

In conclusion—on the work of scientific research institutes under the conditions of self-financing and remuneration in accordance with contracts. The changeover to such a form of remuneration identified the most efficient scientific research institutes, the most urgent themes, and especially enterprising associates—it raised their internal discipline.

However, the changeover of scientific research institutes to cost accounting did substantial harm to basic and

exploratory operations, which are of extremely great importance for science. Enterprises, perhaps, with minor exception, will not pay in accordance with a contract for such operations owing to the uncertainty of their end result. Basic operations should be paid for through some channels or others from the state budget.

It is also necessary to note another thing. The changeover to self-financing did not produce an appreciable increase of labor productivity at institutes. It is probably possible to achieve some increase of the efficiency of science by the overall reorganization of the network of scientific research institutes, for example, by the establishment of institutes-engineering centers chains in accordance with the experience of Academician B.Ye. Paton.

In our opinion, the increase of the demand for science, which is connected with the economic mechanism and the work of enterprises and the still timid rudiments of competition in some forms of it or others, is the main thing.

Of course, not just a year will be need for movement in the necessary direction to appear, for economic processes are extremely sluggish, particularly in such a large country as ours. But for the present, just as in other areas of the economy, science will have to live under difficult conditions, especially as the existing budget deficit will undoubtedly force the state to seek all possible means of reducing spending. The desire to reduce investments in science will probably also be revived.

But it is necessary to carefully protect domestic science during the difficult period from all kinds of chances and ill-considered rash decisions.

And here I see an analogy with living nature. If the body comes under extreme conditions, for example, the conditions of starvation, the brain is the last to die. The living body nourishes it to the last possibility. Science is the same brain, the basis of scientific and technical progress, which is the main means of developing the productive forces of society. We should nourish this brain. For the sake of the present and the future of the country.

Independent Commissions Needed to Evaluate Major Projects

907A0030 Moscow *POISK in Russian* No 23, Oct 89 pp 1, 3

[Article by Yelizaveta Ponarina: "What Should Science Be? Reanimation of Expert Analysis"]

[Text] "I forgot to state the most important thing: the UkSSR Council of Ministers has passed a resolution on the mandatory expert analysis of all national economic projects. It has entrusted the Union of Scientific and Engineering Societies [SNIO] with implementing them."

Satisfaction could be heard in the voice of L. Dulnev, president of the "Spurt" Association of Enterprises, Cost-Accounting Scientific-Technical and Cooperative Organizations, which exists in Kiev under the aegis of

said union. The council of ministers resolution is essentially an official acknowledgment of the social significance and progressive nature of the association's work.

Splendid. However, it is a local victory. This important decision has been made in only one republic, and it cannot oppose the arbitrariness of union-wide departments. For example, the conflict on the Crimean Peninsula.

Nuclear Plant Over the Abyss

The bell of Chernobyl rings for us all. It finally forced us to look and to realize that nature cannot endlessly withstand human recklessness. Previously approved projects had to be re-examined and reconsidered. State expert studies of the seismicity of the Crimean rayons where the next AES was being constructed were performed. The results were terrifying: the plant was rated at 6 points, but it turns out that there have been 9-point earthquakes there. Moreover, under clayey, sedimentary strata that are already having landslides now, just as a liquid paste in a polyethylene packet can start a mud volcano. Squeeze it just a bit... As Vitaliy Starostenko, UkSSR Academy of Sciences [AS] corresponding member and academic secretary of the Department of Earth Sciences, explains, this means that a volcano could "spit" the reactor block into the Black Sea at any moment.

Indeed, even a small mistake will cost dearly: emissions into the atmosphere scatter radioactivity in a wind rose along the resort shores, perpetually jammed with people. However, the most serious thing is the fact that not even 9 points would be needed for a world-class tragedy: the plant was built on a geological fault, as though on two unstable stools. A slight shift of the layers, even half a point, is enough, and calamity is inevitable.

All these facts were set forth in the appropriate document, signed by scientists from different seismic regions of the country. Only three of the 16 participants did not sign the document: two specialists from Minatomenergo and the chief engineer from the Crimean Nuclear Plant project. Their special, departmental opinion is explainable: tens of millions of rubles have been spent already and a city for the power engineers has been built. Really, though, if a pistol is purchased, must it be fired?

Human logic is in disagreement with departmental logic. As it is said in the UkSSR AS, the Minister of Nuclear Power Shcherbin turned to N. Ryzhkov, USSR Council of Ministers chairman, with a loose interpretation of the commission's conclusions. The scientists, they said, were unable to come to a common point of view and others should be invited: their own, and foreign. After receiving consent, the minister did not make his plans known to the experts from the first commission. They heard about this by accident during a briefing broadcast on television. They discovered that Italian specialists had been invited for a second expert study. Why Italians? Perhaps because colleagues from the FRG and Japan did not agree to participate in this action? Or maybe in connection with the fact that the Italians had prohibited the construction of an AES along a shore in their own homeland?

In general, nuclear plants are being built in Western countries. However, all the information is entered into a computer, which makes conclusions regardless of anyone's group interests.

And we? Protesting against the construction of the nuclear plant in the Crimea, people formed a human chain from Feodosiya to Kerch, but rumor has it that Minatomenergo has already started up the reactor. One small thing remains: loading the fuel. Then there will be no turning back.

This whole story is a graphic result of the absence of the practice of independent scientific expert analysis in our country, the authority of which would determine the attitude toward its conclusions both on the part of the population, as well as of the government. However, creating such an institution for independent expert study is only within the strength of a society where the prestige of science is sufficiently high. Here, it is really...

The situation of scientists today is such a painful problem that a discussion of it started at the UkSSR AS, where the heads of several leading republic scientific research institutes were invited to a "roundtable" by our editorial board.

The Dnepr for 40 Rubles

"What kind of respect for scientific work in a society is there, if the people working in it are paid lower than the average?" B. Stogniy, chief scientific secretary and corresponding member of the UkSSR AS, temperamentally began the discussion. "It is not that we are poor. We were poorer in 1945, but the American bomb 'illuminated' Stalin and science moved into first place among the economic sectors in terms of salary. Later, priorities changed, especially when Reagan came to power in the United States and his administration decided to reduced outlays for basic research. We happily embraced this idea. However, after a year the Americans came to their senses and made up for the damage with interest. Here, however, the mistake has not been corrected to this day.

"The idea of financing the most talented by way of grants is also not the answer," Yu. Gleba, UkSSR AS academician, tried to lead the conversation onto a calmer track. "They are allocating grants without a wage fund and as they prefer... within a narrow circle. I am participating in two expert analysis projects in Moscow: on the development of scientific concepts and on the evaluation of grant proposals. It is no accident that they forgot to invite me to the meetings of the former, and that, in time, they informed me of the time periods for allocating funds at the second."

Such stories demonstrate how strong group interests are in the scientific environment, provoked by the need to beg or fight for research financing. We must develop a mechanism for struggle against such maneuvers. We should cleanse the ethics of science with glasnost in any form of expert analysis, be it on grants or on projects. This must be done before the train has left, not after.

"It really is time for us to stop being hasty, hanging anything around our necks without thinking," UkSSR AS Academician L. Markovskiy supports Yu. Gleba. "Here I always think of the project to build the oil pipeline from Alaska to the center of the United States. For a long time they did research and expert analysis, and Congress discussed it for about 5 years before finally deciding to build. All problems were considered: technical, transport, right up to how it would affect the migration of deer and swans... Then they built it in 2 years. Here everything is just the opposite. First, like the Crimean AES and the Volga-Chogray, we swarm. Later, we scientists investigate: what for, why there, where should it be? Moreover, we are required to investigate rapidly. It is your civic duty to the people, they say.

"I think that we need not duty, but personal and professional responsibility—of a whole reputation, materially supported," N. Novikov, UkSSR AS academician, enters the conversation. "We have ceased to value intellectual labor. Today, a seamstress gets 50 rubles for sewing a dress. Yet, how much do they pay (only recently, before—not a kopek!) a scientist for the expert analysis of a canal project, the construction of which will affect the destinies of many generations and maybe the ecology of the whole planet? Forty rubles. Compare the burden of responsibility, the level of knowledge and experience required... It is time to launch a slogan for the century in the country: "Take care of the scientists!"

"Indeed, there was such a slogan," L. Markovskiy suddenly smiled. "In Africa, when adversaries attacked Napoleon's camp, his first order was: 'Into the car! Oslov and the scientists in the middle!' In order to protect and guard them. Means of transportation and minds were considered most valuable, but now utilitarian applications are sought for minds..."

"Unfortunately, even the government demonstrates disdain for science," B. Stogniy verifies. "Right now, apparently, it is placed lower than everyday services. In August we received a USSR Supreme Soviet resolution, according to which a super-progressive tax is levied on the increase in the wage fund. The exception is for the spheres of services and production of consumer goods.

"What does this mean for academy organizations? Right now, our wage fund, along with increases, amounts to 2,400,000 rubles. Over the last, control year, it grew by 300,000 rubles. According to the new resolution, this means that we must now give the state 1,200,000 rubles. That is, the amount is reduced by half. Naturally, this irrevocably damages science.

It should be noted that the leaders of academic institutes have a complex attitude toward cooperatives. Many of those present at the "roundtable" praise them, albeit for the fact that they free the directors of scientific research institutes from concerns about repairing equipment. They were criticized more severely for their incomes, incomparable with the state pay for scientists.

"Really, are cooperatives going to start financing genetic engineering?!" Yu. Gleba exclaimed in a temper.

To a certain extent, the "academicians" are right. However, does this mean that we must "squeeze" the new forms of scientific organization?

Professor on Contract

Unfortunately, the application of the super-progressive tax to science is explainable. With the appearance of cost-accounting NTTM centers and scientific cooperatives, many scientists have been breathing more freely. A legitimate, real opportunity to earn additional income has appeared. However, this has not made it easier to live. After all, scientists do not perform material production. Their commodities are forecasts, designs, ideas and developments on paper. However, they do receive real money for these. Essentially, it is an additional wage not covered by a commodity. That is, they only reinforce inflation.

What is to be done? Must we forbid people to earn more?

"We must select cooperatives and scientific centers," believes "roundtable" participant L. Dulnev, candidate of technical sciences. "Only the cost-accounting center or scientific cooperative that puts a science-intensive item into production has a right to exist. Science must not fear to act in contact with the cooperative sector: the fresh blood of commercial activity only enlivens development. Everyone knows that powerful motivation is required for creativity. What stronger desire in the world is there than seeing your own idea bring you a tangible profit?"

Only our domestic fear of private business is stronger...

The "Spurt" Association is also trying to help its countrymen surmount this.

"Why does the Western world, or even Hungary, live better than we do?" Dulnev argues. "Its economic organism is not merely a rigid, awkward skeleton made up of the single 'bones' of big state enterprises. There are also the muscles, tendons, and nerves of small and medium-size businesses. Small enterprises—cooperative and individual—constantly restructure their own production. We should do so here, so that the economic motivations for the developer are related to industry. Meanwhile, our scientists are alienated from the results of their own labor. After all, they do not have access to the resources that exist in production. We must bring together and interweave their interests. A legal reform in economics is imminent. A law on pluralism of property is needed.

"It is time to introduce yet another form: state-cooperative. The profit from its work would not only provide a personal income for its scientists, but also the means for developing basic science, which are not sufficient right now.

"A promising matter," A. Popovich, deputy chief of the Ukrainian CP Central Committee Ideological Department, concludes, "but we should not exaggerate its

potential. Whatever deductions there may be from application work, they still remain only a small part of big science. Budget allocations should be its basic shelter. Without sufficient guaranteed support, basic science becomes shallow, which means that the flow of new ideas for application also runs dry."

Intellect and Cards in Hand!

Of course, there are plenty of doubts. However, it was worthwhile for the association members to approach the Nuclear Research Institute and the institutes for Semiconductors, Physical Chemistry, and Cybernetics imeni Glushkov with their ideas, and they were heard. The suggestion to create a joint stock society was accepted, in order to introduce innovations through the common efforts of the city's enterprises, institutes and cooperatives.

Regional cost accounting cannot be successfully introduced from above. It can only arise as the sum of the mutual interests of different economic forms. While a market is lacking, the association proposes assuming the role of an intellectual intermediate, helping to find partners, implement an unusual idea, release a new product on the market... In short, regular independent expert analysis. The association already has some experience in this.

Moreover, starting capital for new work already exists: a republic joint stock bank for innovations was created which has 24 million in funds at its disposal. Innovative developments can be applied with these funds.

Really, using expert analysis, "Spurt" was able to save a great deal of money for the republic Minlegprom this winter. The situation was as follows: the country had allocated 70 million hard currency rubles to the republic for re-equipping light industrial enterprises. The money had to be spent carefully: it was taken on credit. This means that the mistakes previously made in buying technologies should be taken into consideration. A difficult task...

Only highly skilled programmers could clearly determine what was needed to solve it, yet there are no such programmers in the factories. Minlegprom turned to the city SNIO for help.

Representatives of various scientific research institutes in the country, including academic, acted as experts. Having studied the protocols of a company's negotiations and proposals, the experts spotted a danger threatening the sewing factories: installing entirely different computer systems. This would make the sector unmanageable.

Having explained their conclusions, the experts suggested that Minlegprom immediately give seven of the nine factories being re-equipped to a single, standard company.

In short, the outcome of the expert study exceeded all expectations. As practice proved, its cost was only a few kopeks compared to the gains. The point is not even the hard currency, but the opening prospects for developing the sector and the entire region.

Judging by the recent UkSSR Council of Ministers resolution, they have decided to apply this practice to other sectors of the economy. Independent scientific expert analysis is a real method for struggling against the departmental monopoly on truth, for protection from their arbitrariness. Thus, this step toward common sense must be made without delay, gathering the forces of science into an institution for expert analysis, for the sake of the country's present and future.

Commission to Rehabilitate Oppressed Scientists Proposed

907A0024A Moscow NTR: PROBLEMY I
RESHENIYA in Russian No 19, Oct 89 p 1

[Article by Yaroslav Golovanov and Vladimir Gubarev:
"I Suggest"]

[Text] We suggest creating a public commission to study the scientific legacy of repressed Soviet scientists, like the kind of commission which is now studying the works of repressed writers.

For many years any such free scientific thought was persecuted here with an effectiveness, in the face of which the medieval bonfires of the Inquisition pale. We lost Chayanov and Vavilov. We were deprived of hundreds of potential Lomonosovs, Mendeleyevs, Lebedevs and Klyuchevskiys, and miraculously we have preserved the best that we have today. The same thin layer of intelligentsia, which makes the people a people, the same valuable patina that was fostered for centuries, has been ruthlessly cleaned off over several decades. Little of it remains today.

That which has happened to our science cannot be repaired in a year. For a long time to come, we must rid ourselves of "internal self-sufficiency," of the throngs of aggressive mediocrity, of the Trofim Denisovichs, dead or alive, and of "what can I do for you?" type scientists. We are faced with learning a healthy scientific ethic,

which many talk about, while then and there signing their names to the works of others. We must accustom ourselves to strict principles of scientific knowledge, not checking against the "effective" line at a given moment. We are still far from a state of science in which talent is cultivated, not stolen or suppressed. Scientists must once again earn a credit of trust among the people—a trust, which they often lack now. In other words, if not from zero, in any case from a very small starting surplus, we must once again undertake the scrupulous, atom by atom, cultivation of that unique stratum, comparable in terms of value to the ozone layer, the Soviet scientific intelligentsia. Today, in the age of Chernobyl, the Aral Sea, polluted nature and the AIDS pandemic that threatens everyone, this is entirely necessary. It is impossible without restoring the continuity of generations.

As scientific journalists, we often have to work with materials about repressed scientists. This work has been done for along time and by a great many. Not only the most popular, but also the purely scientific publications are turning to this topic today. For example, in one of its latest issues, PSIKHOLOGICHESKIY ZHURNAL announced its intention to publish a list of repressed psychologists. It is simply necessary to bring all this information together.

The commission which we suggest creating is not only a tribute to memory, but also a restoration of memory. They say: science does not stand still and a much is hopelessly obsolete. However, it cannot be helped: this section of the path, essentially stolen from our science, should be crossed, even if only by studying the materials left behind. We are not guilty in the tragedy of the innocently murdered, but if we pass by that which they left behind, it will be our eternal shame and irrevocable loss.

The commission could be created under "Memorial," or better still, under the recently formed Union of Scientists. Other variants are also possible. The main point is to create it.

Radiobiology Conference Ignores Major Issues

907A0025A Moscow NTR: PROBLEMY I
RESHENIYA in Russian No 17, Sep 89 p 7

[Article by NTR: PROBLEMY I RESHENIYA science observer F. Vladov under the rubric "The Rostrum": "There Was No Debate.... Notes of a Journalist After the 1st All-Union Radiobiology Congress"; first paragraph is NTR: PROBLEMY I RESHENIYA introduction]

[Text] A quarter century ago I graduated from Moscow University and since then have participated in the work of tens of conferences and symposiums, congresses and conventions. I listened, spoke, organized, and finally prepared newspaper materials on them. And never did I end up in such a difficult position as now. One of the sorest points of current life—the consequences of the Chernobyl catastrophe—was at the center of attention of those who had gathered. It is not surprising that a large number of problems of our society: the strength and weakness of science, the relations of the "center" and the "periphery," the consequences of the administrative command system of management and excessive secrecy, and much, much more, were reflected in the work of the congress of radiobiologists as in a drop of water....

Modern radiobiology includes a large number of directions. Both individual cells and biocenoses have become its objects. Its means of influence run from "small doses" of tenths and hundredths of a rem to enormous doses of tens and hundreds of thousands of rem. Its goals run from the "survival" of cancer cells to the stimulation of the growth of agricultural plants and the protection of people against radiation injuries. And although the 1,200 scientists, who came to the congress from all corners of the country, were divided into 20 sections, at each of them the word Chernobyl was probably the most often repeated word.

The problems of radiation safety, which are connected with nuclear power plants, were discussed at a special section, the colloquium "Radiobiology and Chernobyl" was organized at the request of the congress participants, nearly all the reports at the final plenary meeting were devoted to some aspects or others of the accident. And all the same it was not possible to take a decisive step toward the solution of the most important problem, which worries everyone, of ensuring the safety of the population which suffered as a result of the explosion at the fourth unit of the Chernobyl Nuclear Power Plant.

As I have already written (NTR, No 15, 1989), three points of view on the maximum radiation dose have formed. The first one, which was proposed by the National Commission for Radiation Protection (NKRZ), presumes to take as such the value of 35 rem "in a lifetime," that is, over 70 years. The second one, which is defended by Ukrainian scientists, reduces this dose to 7 rem. Finally, the third one, which was advanced in Belorussia, in general proceeds not from the absorbed dose, but from the level of contamination of

the locality of residence, specifying its maximum permissible amount at 15 curies per square kilometer.

It was proposed to compare and discuss all three concepts at the August meeting of the National Commission for Radiation Protection, but for some reasons or others neither the authors of the "Ukrainian" concept nor the authors of the "Belorussian" concept came there. They were here. But a debate, the most constructive debate, which "gives rise to the truth," also did not take place at the congress.

Meanwhile, the most important decisions: who to resettle, how many, and where, where are measures necessary and what measures are necessary, depend on which concept will prevail—will be adopted by the leadership which is invested with authority. Without exaggeration, hundreds of thousands of residents of Zhitomir, Gomel, Mogilev, Bryansk, and other oblasts are awaiting these decisions. So why "is science remaining silent"? Why were the discussions at the congress often reminiscent of a dialog of deaf people, when each one says his own thing, without hearing the arguments of the person with whom he is speaking?

I believe that the personalities of those, who stand up for the different concepts, the strong and weak sides of these people played not the last role here. "Professionals" and "dilettantes"—I had occasion to hear such definitions more than once respectively with regard to the members of the National Commission for Radiation Protection and to the authors of the republic concepts. And although among the latter you would not call many novices in radiobiology—let us recall if only Corresponding Member of the Ukrainian SSR Academy of Sciences D.M. Grodzinskiy, the ideologist of the Ukrainian concept—still a grain of truth, undoubtedly, exists in such a division.

It so happened in our country that nearly everything, which is connected with the effect of more or less significant doses of radiation on man—except, of course, purely therapeutic radiation treatment—for a long time was concentrated in "atomic" departments and spread, for the most part, under the stamp "top secret." In the thick shadow of the former Ministry of Medium Machine Building a comparatively small group of medical personnel and radiobiologists for long years accumulated, analyzed, and generalized the results of the random (accidents) and systematic (permissible doses) exposure of people to radiation. With regard to their work they were obliged to know everything, with regard to their position they could not tell anything.

Chernobyl exploded the situation. First, it was impossible to hide it, especially under the conditions of the already begun perestroika. Second, the scale of the catastrophe was such that it was necessary to increase sharply the number of radiobiologists, nuclear medical personnel, and radioecologists. Novices came first of all from related occupations, just recently these were simply medical personnel, simply biologists, simply ecologists,

chemists, physicists, agronomists, and so forth. Alas, they did not have behind them the school of "Zubr"—N.V. Timofeyev-Resovskiy—who is now well known to everyone, and the experience, which was gained at the Institute of Biophysics, in many respects remained inaccessible. Glasnost in this area lagged appreciably behind perestroika, and the difficult experience of "the Ural track" had still not become accessible to specialists.

Hence the difference in the approaches. Chernobyl for those who passed through Kyshtym is unique only in scale. The mechanisms of radiation injury, in their opinion, do not have a particular specific nature here. It is not the concentrations and structures of radioactive isotopes that are important, but the dose, into which their radiation is converted in accordance with completely specific formulas.

In conformity with the "thresholdless" concept, any, even the smallest dose can have, although a small one, an adverse effect on the body. How is one to establish the maximum permissible dose? Exact calculations do not exist, one has to balance on the edge of what is called "the acceptable risk." On the one hand, the dose should be sufficiently small so as not to cause any appreciable deviation in the statistics of the morbidity and death rates. On the other, if it is set too low, one will have to additionally evacuate a large number of people. As is well known, such resettlement is always accompanied—not to mention the large expenditures—by an increase of morbidity (especially among children and old people) and even by fatalities.

After the bombing of Hiroshima and Nagasaki about 100,000 Japanese, who were exposed to radiation, but survived, were placed under special medical monitoring. Among them several tens of thousands received a one-time dose of 25 to 50 rem. After 40 years of observations no appreciable deviations in the indicators of the morbidity and death rates were noted among the members of this group, among their children, or even among their grandchildren. Moreover, the state of their health was even better than in the control group, which, incidentally, Japanese physicians explain precisely by stepped-up medical monitoring.

Granite is well known as a material which has increased radioactivity. It turned out that in Sweden, where granite is used extensively in construction, many residents under ordinary conditions receive an annual dose of 0.4-0.5 rem, that is, nearly the same 35 rem over 70 years.

A large number of similar reports on the connection of the size of the dose with the morbidity rate were analyzed in the National Commission for Radiation Protection, before its executives settled on 35 rem over 70 years as the limit of the acceptable risk.

This means: if the total amount of internal and external irradiation at a given place over 70 years exceeds 35 rem, evacuation is necessary, if it does not, resettlement is not mandatory.

What are the opponents of this concept opposing to it? First, the shortcomings of dosimetry. Indeed, in order to be certain that a person has accumulated not more than 35 rem "in a lifetime," it is necessary to know quite precisely how much he has already received. Meanwhile, dosimetry during the first days after the accident, when millions of curies escaped daily from the reactor, was at an awfully low level. Whereas only instruments with a range of up to 3.6 roentgens an hour operated at the plant itself, it is possible to imagine what happened in the surrounding settlements and villages. And although methods of retrospective dosimetry exist, thus far they have been used not very carefully.

Further, doubts were voiced about whether the conditions, which are being advanced as necessary for the reduction of irradiation, will actually be observed.

A conversation with one official of the USSR Ministry of Health convinced me that such a danger exists. In his words, when the first radiation maps of the exposed territories had been compiled, they assembled all the local authorities and said: it is necessary to move the people from these population centers, it is possible to leave people here, while it is possible to live here only if "clean" foodstuffs, fuel, and so forth are brought in. All this was promised, but, as we now know, in many places this was not carried out. But then the same executives today are accusing the same medical personnel of "poisoning the people."

I purposely combined these objections. They are not at variance on the whole with the concept of the National Commission for Radiation Protection, rather they appeal to its executives, who for a long time have been accustomed to precise information and almost military discipline when fulfilling decisions, to come down to earth and to compare their demands with reality.

A few arguments are connected with the uniqueness of what is happening at Chernobyl. Among them is the high concentration of "hot particles" (submicron-size grains of, for example, graphite, the crystal lattice of which is filled with some radioactive isotope). Entering the body during breathing, they settle in the lungs and create there in a microvolume a high concentration of irradiation.

The effect of hot particles is an important scientific problem, and, honestly speaking, I expected its serious discussion. But, having been clearly posed by the already mentioned D.M. Grodzinskiy, it evoked practically no response. And if I had not then approached the members of the National Commission for Radiation Protection, I would have simply remained convinced that they, when calculating their 35 rem, had not taken these particles into account. But I approached them and found out that hot particles are by no means a new problem, they appeared in case of many accidents. In our country dissertations have been written on their properties, while the ICRP [International Commission for Radiological Protection] (an international commission) in one of the recent documents generalized the world experience of

their study and stated that the contribution of hot particles to the total dose usually does not exceed 5-10 percent.

I did not understand just one thing: Why was all this not said from the rostrum and did it remain, most likely, unknown to many congress participants? However, I will return again to this question.

But, perhaps, the most weighty objection to "35 rem" was synergism, owing to which different, but simultaneously acting factors as if help each other, and their total resultant effect can greatly exceed the simple sum of the effects of each of them. More simply speaking, radiation in pure form is one thing, while in combination, for example, with nitrates or with a shortage of trace elements—for which, incidentally, the Polesye is "famous"—it is something completely different and far more destructive.

Unfortunately, medical diagnosis and, accordingly, statistics in the affected regions before the accident were at such a low level—which is characteristic, of course, not only of these places—that they did not make it possible to make a qualitative comparison of the indicators. But the results of a veterinary inspection of cows, which was conducted in early 1986 by associates of the Ukrainian Agricultural Academy at several farms of the Polesye, made a strong impression on me. Thus, at one of the kolkhozes they examined 1,400 cows and found that among one-third the heart tones are irregular, one-fifth have hypertonia, among one-seventh the liver is enlarged; more than half suffer from a disturbance of thick coating and anemia of the visible mucous membranes; the average weight of newborn calves is 18-20 kilograms (one-half to two-thirds the norm), and during the preceding year of 1985 alone this herd accounted for 14 instances of births of freaks and stillbirths. The reason, in the opinion of the researchers, is the sharply reduced, by an order of 10 as compared with the norm, quantity of trace elements in the ration of the animals. But do the people here really drink different water and eat different grain and different vegetables?

In short, there is every reason for manifestations of synergism. And again I waited in vain for fruitful polemics if only on this problem. But an exceptionally important task is to determine the significance of each factor in the sum total, to evaluate how it is possible to influence it, and to decide, finally, which is better: Is one to decrease the maximum dose, having thereby expanded the scale of evacuation, or is it sufficient in a number of places to supply the population with the necessary trace elements and vitamins?

Why did such a discussion not take place? Either at the special colloquium or in the debate within the plenary meeting.... Why in general were there at the congress so few well-argued, truly scientific debates, while if they did occur, the audience surprisingly quickly polarized into the already mentioned "professionals" and "dilettantes," and the debate acquired once again such an

emotional tone that the hall simply "slammed" the disliked speaker? I do not know how it was in the individual sections, but at the large meetings of the congress more of a "meeting" democracy than scientific democracy reigned....

It is unpleasant, but necessary to write about this. The situation, which formed at the congress, could have been easily predicted by any psychologist. The departmental press weighed heavily too long on science, restricting the freedom of scientific inquiry. Too often the interests of departments prevailed over the interests of both the scientific community and our entire society as a whole. For at Chernobyl the truth about what happened for a long time was sealed even from specialists! All this could not but sow distrust of departmental information, departmental decisions, and, of course, the people who implemented such decisions. And although today the stamp of secrecy no longer hides anything in this area, the distrust as before remains. This is probably natural, but the primary thing here is not to throw out the baby with the bathwater.

I do not know whether it is an anecdote or the truth, but they recently told me how they asked one of the foreign experts, who were invited to our country for consultation: "How many years have you been working in atomic power engineering?" "It will soon be 30 years," the foreigner, who was proud of his many years of experience, replied. "So is it really possible to believe you? You have been connected so many years now with this area...." "But what is it," the specialist was amazed, "do you want to find an expert in atomic power engineering, who is not connected with atomic power engineering?"

Knowledge, be it even knowledge acquired at recently closed organizations, is all the same knowledge. It is possible to dispute the interpretation of facts and to refute hypotheses and theories—one must not just refute and pass over knowledge merely because it is "departmental" knowledge.

But there is also another aspect of the question. During the long time of work under the conditions of secrecy scientists lost the taste for open polemics. Indeed, why argue with researchers "not of our system," if, first, not everything can be told them and, second, their influence on the making of some decisions or others, to put in mildly, is problematic? Such a position formed over the years, but today it is already perceived as a hangover of the past. It is necessary to get rid of it as soon as possible, and there is just one solution here: the most open and representative discussions. And if first of all specialists should participate in the debates, everyone who wants to should know about them and about the advanced, rejected, and victorious arguments. To me personally a television debate, perhaps even a direct relay from the corresponding meeting of the National Commission for Radiation Protection, seems very useful. The experience of the Congress of People's Deputies showed with what unremitting attention viewers follow such reports, and I

would like to look at the resident of the Polesye, who turns off his television during this broadcast.

But these are all dreams. While for the present.... The congress of radiobiologists did not adopt the concept of 35 rem. It also did not adopt any other concept—strictly speaking, they were not even discussed seriously. Moreover, it was decided that radiobiology for the present is

not ready to give recommendations on the maximum permissible doses for the population of the affected regions. It is necessary to wait. For new research, laws, theories....

Well, it is easy for science to wait—it has an eternity ahead. But what are we, people, to do meanwhile?

New Computer Publication Devoted to Networks

907A0028A Moscow NTR: PROBLEMY I

RESHENIYA in Russian No 19 (106), Oct 89 p 2

[Interview with V. Drazhinov, editor in chief of the periodical bulletin SETI, by NTR: PROBLEMY I RESHENIYA correspondent V. Kamnev: "For the First Time About SETI"; date and place not given; first paragraph is NTR: PROBLEMY I RESHENIYA introduction]

[Text] The joint Soviet-American venture Information Computer Enterprise, which began its activity with the publication of the journal MIR PERSONALNYKH KOMPYTEROV (see NTR, No 17, 1989) and the supplement PK-EKSPRESS, is beginning the publication of the periodical bulletin SETI. This will be the first periodical in the USSR, which is devoted to computer networks. In an interview with our correspondent, V. Drazhinov, editor in chief of the future bulletin, said:

Drazhinov: The first two issues of SETI will go on sale at the end of the year. While starting in January subscription to the bulletin will be announced. This will be a newspaper-type publication 32 pages long with an initial circulation of 50,000. The cost of a single issue is 2 rubles.

We will include in the bulletin SETI the most interesting materials from NETWORK WORLD, the weekly of the American company IDG Communications. For the most part we will direct attention to articles from the heading "Theme of the Day," which tell about the main events in the world of computer networks. In our opinion, the materials, which are devoted to the analysis of the market of networks and its trends, as well as reports on new products of computer firms (something new of theirs appears almost weekly) will arouse great interest among readers.

Kamnev: What do you intend to publish in the first issue?

Drazhinov: The article "Software Products," which is devoted to combating viruses in computer networks, will certainly attract attention. We also regard as a key one the report, which tells how the reliability of networks is ensured—by hardware, software, and organizational and legal means. Reliability is all but the primary demand on a network—the existence of malfunctions reduces their efficiency to naught. The report on a new type of service

to personal computer owners—Videotext or Teletext—will also be rather interesting. Having at home a Teletext terminal, the user obtains access to a large file of the most diverse information—on the weather for the next few days, on the availability of airline and railroad tickets, on vacation spots; he can familiarize himself with many library catalogs, download new computer games, teletales....

Kamnev: And what about Soviet materials?

Drazhinov: Such materials will not be in the first two issues, but in the future we, of course, will publish such articles and, moreover, editorial commentaries, which are devoted to questions of the introduction of networks in science, culture, production, and other spheres of human activity.

Kamnev: But do we have something to say about this?

Drazhinov: Of course. I can name straight off at least six types of computer networks, which were developed by our scientific production associations; moreover, several of them are quite capable of competing with western ones. It is another matter that we lag seriously in the element base. But as for networks, as is known, the State Committee for Computer Technology and Information Science has announced a 5-year program, which will make it possible to provide our country with the most advanced computer networks. I hope very much that this program will be fulfilled. In my opinion, it is entirely practicable.

Kamnev: Who or what might oppose the fulfillment of such an ambitious program?

Drazhinov: Only one thing—what in general is hindering technical progress in our country. In the country the wage is so low and the prices for equipment are so high that it is simply unprofitable to replace a man with a machine: one computer now costs as much as an employee earns at times during his entire labor life.

Kamnev: Will anything from our computer departments be able to have an influence on your bulletin?

Drazhinov: I do not think so. We do not depend on any of them. Of course, one bulletin on networks for the entire country, especially if you consider that in other countries there are tens of similar publications, is not too good a defense against the monopolism of the producer, but I believe that this, too, is already a victory.